The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Wartime Production of Synthetic Phenol

ON several occasions previously we have commented upon the series of special reports which is being issued by the Department of Scientific and Industrial Research in connexion with the technical records compiled by the Department of Explosives Supply during the war years. Report No. 6, which relates to the manufacture of synthetic phenol and picric acid, has just come to hand, and we note that Mr. W. Macnab, C.B.E., has again undertaken the work of compilation. Official documents, if we may say so, are not invariably methodical or systematic in their manner of presenting facts. One is apt to lose their substance in an entanglement of irrelevant detail and stereotyped phraseology. It is, therefore, all the more welcome to find that in these reports we are given a concise and even engaging description of the various processes to which they relate, and both technical and structural details are amply clarified by the lavish inclusion of reaction formulæ and process diagrams.

The report under notice deals with its subjects in two distinct sections, the first of which gives a workmanlike survey of the methods of preparing synthetic phenol and the chemical problems associated with its manufacture. As is well known, phenol is one of the most important products of the coal-tar industry, and although it is contained in coal-tar in comparatively large quantities its isolation is not altogether a matter of simplicity. Apart from this fact, however, it became apparent in the earlier periods of the war that the supply from such sources would form but a meagre proportion of the likely requirements, and the production of the product by synthetic means became imperative. In this direction we were severely handicapped in that the process, although it had been operated for a number of years on the Continent, was entirely new to our own chemists. The synthesis of phenol on a large scale is by no means a simple proposition; and, when one bears in mind the scale upon which the process was ultimately carried out, it is almost difficult to persuade oneself that the facilities for production which existed at the end of the war were purely the result of the laborious development of first principles. In this connexion one cannot overlook the pioneer work of the South Metropolitan Gas Company, first at their Old Kent Road works, and subsequently at East Greenwich. On one occasion we had the privilege of inspecting this carefully guarded plant, and were struck with the remarkably orderly way in which the operations were conducted, the generally finished appearance of the plant, and the matter-of-fact manner in which such a novelty of the kind was regarded.

The greater portion of the phenol produced in this country during the war was prepared from benzene, the supply of which was vastly augmented by the introduction of "stripping" processes in connexion with coal gas. In this country plants were erected in some half-a-dozen localities, and the synthesis was in all cases carried out from benzene proceeding through benzene sulphonic acid. Though the general features of the process were identical, however, the details of operation differed in almost every case, with the result that the problems of manufacture varied to some considerable extent. In July, 1916, the chief French factories were inspected; and, as the French practice differed in many respects from our own, the methods in use in this country were reviewed. Systematic investigation was made into the losses arising during manufacture, and a study was undertaken of the methods by which those losses might be reduced. Subsequently, it was clearly appreciated that under certain conditions the total loss in all stages of manufacture might be reduced to 10 per cent. instead of the 30 to 40 per cent. obtaining in many cases. The manner in which those losses occur and the means of their elimination are admirably set out in the report, and the facts brought together should prove of inestimable value to private enterprise in

this country. It is shown that the maximum yield of pure phenol which appears to be obtainable is about 90 per cent., the loss being accounted for mainly by side reactions during fusion. In practice, however, the yield of 90 per cent. has rarely been obtained as such a result depends upon perfect sulphonation and conversion to sodium salt.

The section concludes with a detailed description of the process conducted at the Government factory at Ellesmere Port, comparisons between the results of the various home and foreign plants, and a consideration of the constitution of the raw materials employed.

Picric Acid Processes

THE second section of the report referred to above deals exclusively with picric acid, which prior to the war was the standard high explosive employed by the British fighting services. Apart from this, picric acid is, of course, employed in the dye industry, but in times of peace the total quantity used is comparatively small. The product was not manufactured by the Government, but was purchased entirely from private firms, the manufacturing process being carried out in a very primitive manner which had been in vogue for many years and was handed down by tradition. We are told, in fact, that frequently there was little in the way of chemical supervision, and consequently the quality of the product could not be relied upon. The enormous increase of picric acid which was demanded on the outbreak of war brought considerable difficulties in its train, for contracts had to be placed with firms who had very little experience, the result being that the material frequently fell short of the somewhat strict specification. At times the possibility of a shortage caused considerable anxiety, but productive capacity was gradually increased, while the situation was eased by the replacement of picric acid by amatol which was less costly to manufacture. In fact, by the end of 1917 the demand for picric acid had decreased so much that it was necessary to shut down a large proportion of the factories.

The universal method for the manufacture of picric acid was from phenol by the use of sulphuric acid and nitric acid. Hence the necessity for augmenting the phenol supply by synthetic means. In the first place attempts were made to improve upon the "pot process," and concurrently research was undertaken in connexion with alternative methods of manufacture. At an early stage the process for producing picric acid from dinitrochlorobenzene was put into operation; and while at first this method left something to be desired it was considerably improved and ultimately formed an economical and efficient method. Amongst alternative processes which were tried out but which did not prove sufficiently satisfactory to justify their adoption on a large scale may be mentioned (*a*) production from benzene through nitro-benzene and nitrophenol; (*b*) production through sulphanilic acid and (*c*) production from Yacca gum containing phenolic compounds

The report contains an admirably detailed description of the "pot process," while one notices an interesting *résumé* of the continuous method which was worked out by Brookes' Chemicals, Ltd. There is also a useful survey of the dangers associated with manufacture, and it is well worth emphasizing that, although from the standpoint of personal appearance it is objectionable to be classed as a "canary," the discoloration of the skin does not appear to produce any ill-effects, and there is no likelihood of the workers contracting dermatitis as with TNT and tetryl. The main drain on the picric acid supplies (apart from explosives) was for chlorpicrin, large quantities of which were required.

A Repeal Bill

AMONG the private Bills presented in the House of Commons on Friday, February 10, was one "to repeal the Safeguarding of Industries Act, 1921." It was presented by Mr. Alexander Shaw, and supported by Mr. John Wallace, Sir Charles Sykes, Captain Colin Coote, and Sir Evan Jones, and is put down for second reading on Friday, April 7. As a private Bill it may not require to be taken too seriously, but there is one rather significant feature about it. Its supporters include some of the most active Liberal supporters of the Coalition, and their action shows that opposition is not entirely limited to the Free Trade group of Asquithian Liberals in the House. In this connexion the recent declarations by the Prime Minister, Sir Gordon Hewart, and other Liberal members of the Government in favour of Free Trade may be recalled. At the same time these declarations treat the Acts for safeguarding the dyestuff and chemical industries as emergency measures designed to meet exceptional circumstances, and as not involving any desertion of the policy of free imports in ordinary conditions. It is not at all probable, therefore, that the Government will offer any encouragement to the demand for repeal, nor very likely that a majority can be found to force upon them a curtailment of the period fixed for the operation of the Act. Opinion, however, seems to be returning to the doctrine that imports and exports, roughly, pay for each other, and that where one is restricted the other correspondingly declines. It may be noted that on Tuesday Captain Wedgwood Benn moved for leave to introduce another repeal Bill, but the motion was lost by 78 votes. The supporters of the motion included fifteen Coalition Liberals and six Unionists.

In the United States keen interest is taken in the investigation into the dye industry to be undertaken by a committee. It is intended, we understand, to take, first, the witnesses who will be called in support of the case that a dye monopoly has been or is being created in America, and that improper influences have been brought to bear in order to affect legislation. The reply on behalf of the industry will naturally follow. Previous hearings on the subject of the protection of the American dye industry have produced some very searching inquiries, and the coming inquiry promises to be no less interesting.

Acetylene Gas Dangers

THE Factory Department of the Home Office has just issued a useful little memorandum on "Dangers from the use of acetylene gas and in oxy-acetylene welding in factories" (H.M. Stationery Office, 1d.). During recent years there has been a considerable increase in the use of acetylene gas, mainly in connexion with oxy-acetylene welding and cutting processes, and this increased use has been attended by a marked increase in the number of accidents arising from explosions of mixtures of this gas with air or oxygen. Many explosions have been due to ignorance as to the explosibility of acetylene-gas mixtures. Explosions, it is pointed out, are possible when acetylene amounts to no more than 5 per cent. of the mixture, and under certain conditions pure acetylene is explosive when compressed to a pressure above 30 lb. per square inch absolute, and not contained in a homogeneous porous substance.

The precautions recommended cover nearly all the dangerous conditions, and one of the principal is ample ventilation. Acetylene generator plants are recommended to be installed either in the open air or in a well-ventilated shed or building outside any main building, and a raised platform is recommended for the storage of carbide to keep it dry. Portable acetylene generators should only be used in a building or place with ample through ventilation in a position remote from any fire or combustible material. When artificial light is required in a generator house or near a generator, electric incandescent bulbs encased in outer gas-tight glass globes should be used. No naked light or lamp should be introduced. Tins containing carbide should not be brought into a welding room or near to a flame, and should be opened only in a dry place. Care should be taken to avoid striking a spark against pieces of hard carbide or against the retainer, and not to use undue force when removing hard pieces of carbide which may have become wedged in the feed motions of generators. These and many other hints will be found in the memorandum, which is well worthy the attention of all concerned in the industry.

Books Received

DISTILLATION PRINCIPLES AND PROCESSES. By S. Young. London: Macmillan & Co. Pp. 509. 40s. net.

IS TRADE UNIONISM SOUND? By J. H. Bunting, London: Benn Brothers. Pp. 98. 2s. 6d. net.

PULVERISED COAL IN AMERICA. By L. C. Harvey. London: H. M. Stationery Office. Pp. 117. 5s. net.

REPORT OF THE INTER-DEPARTMENTAL COMMITTEE appointed to consider the Methods of Dealing with Inventions made by Workers Aided or Maintained from Public Funds. London: H.M. Stationery Office. Pp. 25. 6d. net.

TECHNICAL RECORDS OF EXPLOSIVES SUPPLY, 1915-1918. No. 6. Synthetic Phenol and Picric Acid. London: H.M. Stationery Office. Pp. 97. 15s. 7½d.

PNEUMATIC CONVEYING. By E. G. Phillips. London: Sir Isaac Pitman & Co. Pp. 103. 2s. 6d. net.

THE MECHANICAL HANDLING OF GOODS. By C. H. Woodfield. London: Sir Isaac Pitman & Co. Pp. 116. 2s. 6d. net.

RESEARCH IN INDUSTRY. By A. P. M. Fleming, M.Sc., M.I.E.E. and J. G. Pearce, B.Sc., A.M.I.E.E. Pp. 244. 10s. 6d. net.

PRINCIPLES OF PHYSICAL CHEMISTRY. By E. W. Washburn. London: McGraw-Hill Book Co., Inc. Pp. 516. 20s. net.

A COMPREHENSIVE TREATISE ON INORGANIC AND THEORETICAL CHEMISTRY. Vols. I. and II. By J. W. Mellor. London: Longmans, Green & Co. Pp. 1065 and 894. £3 3s. net.

Points from Our News Pages

A short note on "Chemical Warfare" is published from Brigadier-General A. A. Fries, Chief of the U.S.A. Chemical Warfare Service (p. 195).

The inquiry by Mr. Cyril Atkinson respecting cream of tartar, etc., was resumed on Saturday, February 11th and continued on Monday and following days (p. 196).

In his paper on "Studies in Saponification" before the Oil and Colour Chemists' Association, Mr. H. M. Langton gives the results of experimental work by himself between 1917 and 1919 (p. 198).

The question of "Rubber Mixes and Accelerators" was dealt with at a meeting of the Institution of Rubber Industry in Manchester by Mr. J. L. Rosenbaum (p. 201).

Mr. J. E. Hackford, at a meeting of the Institution of Petroleum Technologists on Tuesday presented a paper on "The Significance of the Interpretation of the Chemical Analyses of Seepages" (p. 201).

Under the heading of "The Geddes Penknife," Mr. Ernest Benn discusses the report of the Geddes Economy Committee (p. 204).

The problem of "Corrosion" is discussed by Mr. G. B. Jones, and suggestions for prevention and treatment offered (p. 200).

Several questions in Parliament relating to the Safeguarding of Industries Act are reported (p. 205).

Exports of chemicals during January were slightly better, improvement being particularly noticeable in sodium carbonate and in tar oil and creosote. Imports of indigo (natural and synthetic) and intermediates were nil. Exports of dyes show a slight improvement (p. 203).

Our London Chemical Market report states that business continues to show a tendency to expand, and that in some directions home trade is distinctly better (p. 211).

According to our Scottish Chemical Market report the improvement in the chemical trade, although slow, is being maintained. There have been more inquiries for export, and sales for the home market are better (p. 213).

The Calendar

Feb.		
20	Chemical Industry Club: "Decolourising Carbons." R. Whymper. 8 p.m.	2, Whitehall Court, London.
20	Society of Chemical Industry, Yorkshire Section: "The Structure of Coke." H. D. Greenwood and J. W. Cobb.	Queen's Hotel, Leeds.
20 & 27	Royal Society of Arts: "The Mechanical Design of Scientific Instruments." Professor A. F. C. Pollard. 8 p.m.	John Street, London.
21	Hull Chemical and Engineering Society: "The Prevention of Works Accidents." F. W. Hunt.	Wilberforce Café, Hull.
22	Society of Chemical Industry, Newcastle-on-Tyne Section: "Cement." C. H. Desch.	Armstrong College, Newcastle-on-Tyne.
23	Royal College of Science Chemical Society: "X-Ray Work." Sir W. Bragg.	Royal College of Science, London.
23	Society of Dyers and Colourists, Yorkshire Junior Section: "A Descriptive address on Colloids." Dr. S. A. Shorter.	Leeds.
23	Royal Institution: "Dyeing: Ancient and Modern." A. G. Perkin. 9 p.m.	Albemarle Street, Piccadilly, W.
24	Society of Dyers and Colourists, Scottish Section: "Suggestions towards a Research Policy." Dr. H. H. Hodgson.	
24	The Sir John Cass Technical Institute: "Recent Developments in the Glass Industry." W. E. S. Turner and S. English. 7.30 p.m.	Jewry Street, Aldgate, London.

Langmuir's Octet Theory

To the Editor of THE CHEMICAL AGE

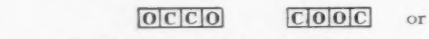
SIR,—In THE CHEMICAL AGE of February 4 Dr. Stephen Miall, in his fourth article, "Notes on Some Recent Chemical Theories," mentions some compounds which Langmuir's postulates do not seem to satisfy.

As I understand Langmuir's postulates, since the successive shells of electrons have, when complete, 2, 8, 8, 18, 18, 32 electrons, the theory of octets is not supposed to apply beyond the third shell. Hence since iodine has 53 electrons, there are 2, 8, 8, 18, 17, and the fifth or outer shell containing already more than eight electrons, the formula $p=\frac{1}{2}(8n-e)$ does not apply.

The case of PCl_5 seems to present no difficulties. Since $n=6$ and $e=40$, therefore $p=4$, the fine chlorine atoms are placed as a cross

with a phosphorus atom on top of the middle of this cross. The P cannot be elsewhere, since there are three vacancies in the outer octet.

In the case of carbon monoxide, if we imagine the double molecule loosely bound and occupying the space of two ordinary gaseous molecules, then Avagadro's Law coupled with density considerations will not be outraged, and for this double molecule $n=4$ and $e=20$, giving $p=6$, whence the double molecule is



NaCl I cannot fit in with the theory.—Yours, &c.,

Addiscombe, February 10. J. H. ALLWORTHY, B.Sc., F.C.S.

Is Shale Oil Profitable?

To the Editor of THE CHEMICAL AGE

SIR,—We have read, with deep interest, the editorial article in your issue of January 14, 1922, and Mr. N. H. Freeman's very capable letter in your issue of the 11th inst. on the above subject.

In your editorial article the question is general, and Mr. Freeman evidently recognises the fact that it is almost impossible to give a specific answer to a general question, and prefers to take a specific case on a particularly rich oil shale. We do not quarrel with the fact that he has taken a particularly rich oil shale, but we suggest that having shown the results obtained from such oil shale he might have also shown that profitable results can be obtained from much inferior oil shales to that he names. Also he might—and still have shown a sufficient profit—have taken a less price per gallon for the different qualities of the oils.

We think he might, with benefit, have more emphasised the point that a deposit of rich oil shale does not mean profit; this is only one part of the proposition. The necessity for suitable plant for "getting" such oil shale, for conveyance, and treatment of such oil shale (particularly the latter) plays an important factor in the final results, and good propositions have been spoiled or the profits made lean by inefficient attention to such factors. But assuming the ideal in the way of material handling plant, retorts, and refining plant, &c., and the richest oil shale, we do not think that it will mean the disappearance of—or even the disappearance of the profits of—at least quite a large number of those companies who are recovering oil from bore-holes.—Yours, &c.,

FUSION CORPORATION, LTD.

Middlewich, Cheshire, February 13. S. WILLIAMS (Assistant-Secretary).

Chemists as Salesmen

To the Editor of THE CHEMICAL AGE

SIR,—Replying to your correspondent of a fortnight since, I am in full sympathy as to our professional services being now at a discount and we realise that, to get out of the old rut of professional practice in analytical, industrial, research, or consulting chemistry, the science must broaden out its spheres into all businesses where the products which we control in manufacture can have the "push" in sales. This is an opening that might stabilise the quality and value of goods bought and sold, even to choice of valuing a particular plant for making the goods. The suggestions in your last issue are Utopian, alas! in this country, nevertheless feasible, but would-be employers who might benefit a 100 per cent by the ideas and by technical experience will not pay remuneration commensurate with the cost of training and factory knowledge spent in education.

At the inaugural meeting of the British Association of Chemists in Manchester in the autumn of 1917, Dr. R. B. Forster struck the right chord for the absorption of chemists when he advocated that, in all concerns engaged in manufacturing chemicals, or where such are employed, the management staff of such undertakings should be in charge of men with chemical training, from the "head" in the business house to the tester in the laboratory. No doubt the prosperity of large chemical concerns is due to such organisation to-day, in adopting this method.

The broadening out of spheres for the new collegiate, as well as the old school of the science, at the moment appears to baffle the councils of all scientific societies, inasmuch as what I term commercial chemistry is no concern, when research must have first field in pure science. The members of the Society of Chemical Industry, consisting of chemists and manufacturers, could do a deal of propaganda work in commercial chemistry and in re-establishing the status of the chemist, but its charter does not allow it to touch the employment interest of its members. All scientific bodies in the recent war were ready to supply technical men to the Government where required, but when Government released these scientists not one body concerned themselves to find out how these men were to live. Your correspondent, "Tenebo," has had one short engagement of four months since 1919, but it is my misfortune to be not so lucky as that since 1918.

Now, sir, I do feel that the field of employment for chemists on the lines you suggest could be broadened out if tackled by a special committee of technical chemists and chemical manufacturers, preferably from the Society of Chemical Industry, to try and remedy the present state of affairs, and be ready to supply professional assistance when the country is in a condition to accept it. It is perfectly obvious that something must be done when, owing to the slump, many old and experienced men are "sitting on the fence," and our universities are pouring out "new blood" into a much overcrowded profession that must have its proper reward in return for outlay in study and practice.

Trusting that your article under this head will open out the ideas contained therein, and that business men will feel the necessity all the more for employing technical men with business acumen as salesmen, I sign myself

February 14. IN SYMPATHY.

Industrial Welfare

To the Editor of THE CHEMICAL AGE

SIR,—The medical committee of the Industrial Welfare Society, of which I am chairman, has been requested by many firms to suggest a suitable form for the use of medical officers when making their examination of employees. As I write about 3,000 medical reports every year, I realise that the carry-out of this suggestion is a more responsible and important task than at first sight appears.

I am endeavouring to secure the kind co-operation of managers and medical officers in this matter, but, since (as I saw it stated a few days ago) there are something like 250,000 factories in the country, it is impossible to secure the fullest possible information without the assistance of the Press.

If firms which have had experience in medical work will send me any forms or suggestions they will be extremely valuable to my committee in preparing the most suitable forms for various conditions. A copy of notes based upon my own experience in industrial medical work will be sent to any who are interested, and I shall value comments and criticisms upon them.—Yours, &c.,

D. A. COLES, M.D.

51, Palace Street, Westminster, S.W.1., February 8.

Lectures on Glass Technology

A SPECIAL course of six lectures on "Recent Developments in the Glass Industry," by Professor W. E. S. Turner and Mr. S. English, will be delivered at the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, on February 24, March 3, 10, 17, 24 and 31.

General Fries and Chemical Warfare

A Reply to British Criticism

WE have received for publication a statement by Brigadier-General Amos A. Fries, chief of the Chemical Warfare Service of the United States Army, replying to some remarks by Sir Edward Thorpe on the subject of chemical warfare at the meetings of the British Association. General Fries writes :—

"From the reports of the meeting of the British Association for the Advancement of Science at Edinburgh, it would appear that that Association, orat least the President of the Association, believes there are genteel methods of murder. The President apparently believes that murder should be carried on genteely and limited to certain methods which appear to him genteel. That is the one conclusion that can be drawn from his talk on the use of poison gas in war.

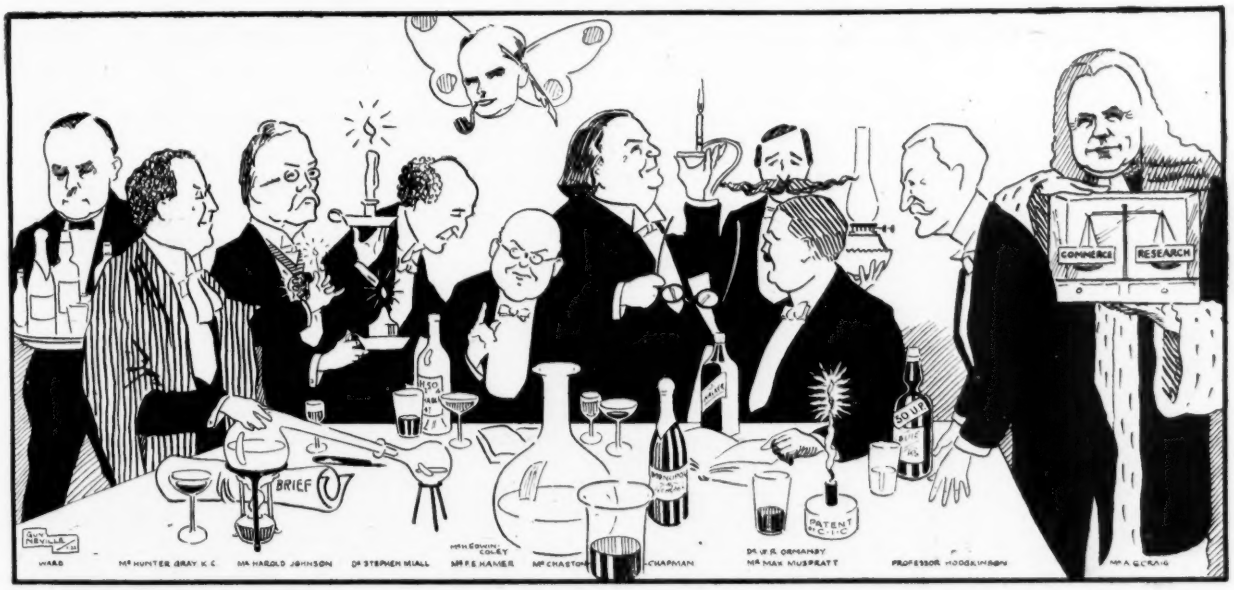
"He declares that science is degraded by continuing to give its support to the use of poison gas in war, but he says nothing about the degradation of science when it sanctions all other kinds of warfare, which figures show to be far more horrible both in the field of battle and in their after effects than gas. Those who survive the terrible mutilation from bullets and high explosives carry scars with them to their graves, and notwithstanding all the efforts of modern surgery, one can see on every hand to-day the disfigured faces, the missing limbs and the closed eyes of thousands of men, all by bullets and high explosives. The President of the British Association for the Advancement of Science would have us believe that these are genteel methods of warfare, that they should be recognised as proper, and that the use of poison gas, which killed but one in twelve compared with bullets and high explosives, and which left no maimed, blinded or disfigured for life, should be outlawed. Science showed, toward the end of the war, that by means of small perforated tin masks covered with a few layers of cheese cloth and impregnated with a little chloroform, menthol and other liquids, the gassed patient could be made comfortable and could be transferred to the farthest hospital in comfort. No such comfort can be given the men torn and shattered by high explosives and jagged shells. To give the man so injured sufficient sedative to make him comfortable is but to hasten his death. It is time science ceased to degrade itself by refusing to admit the truth. The very basis of scientific investigation is truth. Any investigation which dares not face the truth, the whole truth and nothing but the truth is not science.

"We are not pleading for war; we are pleading for peace. To the practical man the only way peace can be brought about in the world—we mean permanent peace—is to make war so powerful and so quick and certain that it will become intolerable. And the wise who would preserve civilisation will use their efforts towards preserving peace, but in doing so will call to their aid every achievement of science to compel those who do not want peace to make peace or be destroyed. The most scientific peoples must use the most scientific methods or they will fast be annihilated by those with more vigorous brute strength and less fine feelings. With the complete development of gases in war, of aviation, and of any other methods of producing casualities that science may invent, the over-running of civilisation by peoples less civilised and less scientific has been made impossible.

"Let us not then attempt to abolish any element of warfare that promises success against those who would break the law. Let us on the other hand develop those methods and serve notice on the law-breaker, whether it be a nation or an individual, that sure and certain disaster will overtake him if he breaks that law, and that if a more powerful means of waging war is discovered it will be used and used to the utmost. Thus will the highly scientific peoples make war intolerable and bring about peace."

Social Clubs for Chemists

MR. H. EDWIN COLEY, honorary secretary of the London Chemical Industry Club, was accorded a warm welcome at Newcastle last week, when he addressed the members of the Newcastle Chemical club on "The Importance of the Social Side of Chemical Industry." Mr. Coley made a strong plea for the extension of the club movement, as the only means whereby that important aspect of the profession, the social side, could be fully advanced. The movement, he said, had gained a solid footing in most industries, and was of the utmost importance to chemists, who were by very reason of their workaday environment secretive and lonely in thought. Many of them were engaged in secret processes and were often working alone. Some relief was necessary from the strain of everyday work, and that must be obtained in the evenings and on special days. The chemist could not get to know the manufacturer and the merchant by listening to long and rather dry papers in Burlington House. It was important, if he was to benefit himself and his profession, that he should know these men, and an efficient club system was the only hope, for the best and quickest way for man to learn to know man was over a meal or smoke. A club, wherein every member was the equal of his fellow member and social intercourse was the order of the day, would go far towards humanising the chemist and raising the status of the profession generally. Mr. Coley gave an interesting outline of the London club, and mentioned, in passing, the urgent necessity for low subscriptions if success was to be attained. He brought a request from his committee that efforts at co-operation between the two clubs should be made. A central organisation, with provincial clubs affiliated, was what he hoped to see in the future. Mr. H. Dunford Smith presided.



An impression by Guy Neville of some of the leading figures at the recent Annual Dinner of the Chemical Industry Club. The original sketch has been presented to the club by Mr. Coley.

Cream of Tartar, Tartaric Acid, and Citric Acid

French Makers' Evidence at Resumed Inquiry

THE hearing of the complaint that cream of tartar, tartaric acid, and citric acid have been wrongly included in the Board of Trade list of articles chargeable with duty under Part I. of the Safeguarding of Industries Act was resumed on Saturday, February 11, and continued on Monday and following days before Mr. Cyril Atkinson, K.C., the Referee.

THE REFEREE said it should be known that the opposition was going to contend that the term "fine chemical" had a well understood commercial meaning, and that "so and so" was that meaning. The cross-examination of witnesses, therefore, should be confined to the main points, namely, Had the term a well understood commercial meaning? If so, what was it? And how were these things regarded in the trade?

Mr. W. Kirby

MR. W. KIRBY (Dewsbury and Brown, Ltd.), cross-examined by Sir Duncan Kerly, admitted that in saying that the manufacture of citric acid was not a complicated process requiring skilled supervision, he was not speaking as a manufacturing expert. He had not seen the substances made on a commercial scale.

SIR DUNCAN KERLY asked if he would agree to the following definitions as indicating a fine chemical: (1) That a chemical must be refined to a pharmaceutical purity; (2) that it is manufactured in relatively small batches under skilled chemical supervision; (3) the supervision forms a substantial proportionate part of the cost of the labour involved; (4) it is manufactured by chemical processes; and (5) is used for chemically reactive purposes.

THE WITNESS said the first three would apply to a substance which could be called a fine chemical. He did not think, however, that cream of tartar, tartaric acid and citric acid complied with them all.

SIR DUNCAN KERLY referred to an attempt made to provide a category of fine chemicals, contained in a paper by Mr. C. A. Hill (chairman and managing director of British Drug Houses, Ltd.) and Mr. Morson, and asked if the definitions had not been adopted by the Association of British Chemical Manufacturers for the purpose of grouping its members.

THE WITNESS said it was an attempt at a division of fine chemicals, but he did not know that it had been adopted. He agreed that laboratory chemicals were always fine chemicals; pharmaceutical chemicals would not always be fine chemicals.

Replying to the Referee, who asked why he could not accept the view that all pharmaceutical chemicals were fine chemicals, the witness said that many were used for other purposes; if only used for medicinal purposes h e would agree. The three substances they were concerned with had pharmaceutical uses, and would naturally be found in pharmaceutical lists, and would often be found in ists of technical chemicals also. He was not aware that any definition of a fine chemical had been generally accepted.

Evidence of French Makers

Evidence was then given by French manufacturers of these three bodies.

M. GLADYTZ (director and manager of Mante & Co.) said his firm had factories at Marseilles and Agde, near Montpelier, and these were manufacturing cream of tartar, tartaric acid, and citric acid. The Agde works had a capacity of about 8,000 tons of cream of tartar per day, and the smaller works at Marseilles a capacity of 4½ tons per day. He described the process of manufacture in order to show that it did not require a high degree of technical skill. The work was, in fact, supervised by boys of fourteen to sixteen years of age, over whom there was a foreman. The manufacture of cream ot tartar was practically automatic. It involved nothing but solution of the raw material, crystallisation, and decolourisation with animal charcoal, and was carried on at the Agde works. In neither of his processes was it necessary to have a chemist to supervise the process. There was also no necessity for skilled chemical control in the manufacture of tartaric acid, and the same class of people were employed, the raw materials being obtained in such a state of purity as to avoid this. The same remarks applied to citric acid. The finished product complied with the standards of purity laid down in the French, British and American Pharmacopœia. During the last six months very little manufacture had been going on, and the larger works were closed.

Cross-examined by Sir Duncan Kerly, the witness said the largest output of cream of tartar from the Agde works during 1913 was 6,000 kilos (about 6 tons) per day, but since the war the output had dropped to about 2,000 kilos. per day. The raw material was tested before it was bought, and was of known composition before use. Occasionally the product of his firm had been rejected because it was not sufficiently pure, but that was due to accident.

Describing the manufacture, the witness said that there was no skilled chemist at the works to ascertain the composition of the materials used, and to select those most suitable for the particular process. Analyses of the final product were made in London before sale to British and other foreign buyers.

MR. WHITEHEAD, for the Board of Trade, cross-examined the witness as to two research chemists who were employed at the Marseilles works. M. Gladytz said these men were only carrying out research; they had nothing to do with the manufacturing process, and would not know what instructions to give to the men if they went into the works. The only test carried out during the course of manufacture was a colour test, which was carried out by boys. The analyses of samples of the finished product in London were made by Teschemacher and Smith, and their goods were sold on their certificate. There were no specialists of this type in France.

THE REFEREE said the whole point was whether there was skilled supervision during manufacture, and the question of testing was rather far removed from that. He put a number of questions to the witness, and ascertained that the boys were taught what to do by the foreman, who himself was usually a man formerly engaged in the works as a carter, stonemason, or anything else. He had no chemical skill, learned his job from experience, and the manager saw that he did his work properly.

M. E. BONNAL (managing director of P. L. Vernier & Co., Montpelier) said his firm had made cream of tartar exclusively for the past ten years, and the output had been about 1½ tons per day. His process was also solution, crystallisation, and decolourisation with animal charcoal. The final product was tested by Teschemacher and Smith, in London, and he handed in certificates in respect of his goods on which they were sold to British buyers. The firm did not employ any skilled chemists.

British Chemical Merchants

MR. CHARLES TAPPLY (managing director of W. C. Bacon & Co., chemical merchants, London) said his firm dealt with the three substances concerned. His firm regarded themselves as dealers in heavy chemicals, and he had never heard cream of tartar, tartaric acid, and citric acid referred to as other than heavy chemicals. If inquiries were received for chemicals recognised as fine chemicals, the firm would not quote.

THE WITNESS agreed, in cross-examination by Sir Duncan Kerly, that the question whether these substances were fine or heavy chemicals did not make a difference to the firm, and if it were determined that the substances were fine chemicals, his firm would not cease to deal with them. The firm would not give up dealing with cream of tartar if it were held to be a fine chemical, because they had had so many years' experience with it. Some people preferred the analyses of Ogston and Moore, but where his firm had one Ogston and Moore test they had two or three hundred by Teschemacher and Smith. His experience was that they were universally accepted.

MR. W. J. CROOK (of the firm of Walter J. Crook, chemical merchants, London), whose firm dealt with the three substances, said he had never before heard them mentioned as fine chemicals.

Asked by Sir Duncan Kerly for his definition of a heavy chemical, the witness said his view was that heavy chemicals were substances turned out in large quantities on a free market, but he also considered the use they were put to. There was, however, no rigid definition, and it was largely a matter of trade usage.

Mr. E. J. Parry

MR. E. J. PARRY (consulting and analytical chemist) said he had not the slightest doubt that the three substances were regarded universally as heavy chemicals, and he had never heard any suggestion to the contrary until he had seen the Board of Trade list. The substances might be found in lists of

pharmaceutical chemicals, but because they had a small pharmaceutical use they could not be defined as pharmaceutical chemicals. By far the larger quantity of these three substances were used for other purposes. As to being manufactured in relatively small batches under skilled supervision, such supervision forming a substantial part of the cost of the labour involved, that was one of the best criteria as to whether a chemical was fine or not, but he did not think any of the three substances fell within the definition.

In reply to the Referee, who asked whether the term " fine chemical " had a definite trade meaning or not, Mr. Parry said it had, but it was so elastic that it was impossible to say where some fine chemicals crossed the line.

Dealing with the Association of British Chemical Manufacturers, Mr. Parry said he had not heard of that body until the previous Saturday, and could not answer Mr. Courtney Terrell (for the opponents) when he said that the greater proportion of the chemical manufacturers in this country belonged to that body. The secretary of that body, Mr. Woolcock, had had a great deal to do with the drafting of the Act.

MR. WHITEHEAD, in the course of cross-examination, made it clear that the Board of Trade list had been wholly and solely prepared by the officers of the Board. He was instructed that Mr. Woolcock had had nothing to do with the schedule.

Opponents' Case Opened

SIR DUNCAN KERLY, K.C., in addressing the Referee for the opponents, remarked that it was quite likely that the process in some works abroad was different from that practised in other works abroad or in the works in this country. At the same time, the witnesses from France had given a very sketchy and unreliable account of their process of manufacture. In connexion with M. Gladytz's evidence, it would be perfectly possible to carry on the process as he had suggested if there was another factory where there were chemists all the time.

SIR ARTHUR COLEFAX said that if this point was to be raised now, the witness ought to have been challenged.

THE REFEREE said he thought he was. He certainly understood the cross-examination to mean that Sir Duncan did not believe that the boys really did the work, and that he wished him, the Referee, to do the same.

SIR DUNCAN KERLY said that was so.

MR. C. A. HILL, B.Sc., F.I.C. (managing director of British Drug Houses, Ltd.), said that before he could define a " fine chemical " it was necessary to define " chemical." Asked by the Referee to define a " chemical," he said he regarded it as a substance capable of being produced in a pure state, and when so produced it had definite and invariable properties dependent upon its molecular structure, so that every specimen of a pure chemical would have the same molecular structure and the same properties dependent thereon as every other specimen. Further, a chemical when pure possessed an identity and could not be separated into two or more substances without losing its identity. A " fine chemical " had certain attributes, such as conditions of manufacture, plant employed, purity, skilled labour, and skilled supervision. He should say that a fine chemical was a chemical produced by skilled labour and under the immediate supervision of skilled chemists and was of a specified degree of purity for a specific purpose. The degree of purity might vary according to the purposes for which it was required. Certain chemicals might be required for pharmaceutical purposes, but the same chemical for research purposes would have to satisfy a different specification for purity.

THE REFEREE said he would take the witness's view to be that fine chemicals were in practice of a specified degree of purity, &c., and were produced under skilled supervision. What had been worrying him was that supposing it were possible to produce a thing in a simple way which would take it out of the definition suggested, and yet a number of people chose to carry out the manufacture in another way which involved skilled chemical supervision, what was going to be the result ? Accepting the evidence of the French witnesses, the product would be a heavy chemical, and yet on the process as carried out in this country these substances would be fine chemicals. At the same time, if the final products were placed together there would be no difference. That was rather worrying him.

SIR ARTHUR COLEFAX suggested that the material evidence was as to manufacture in the country where the substances came from.

The inquiry was still proceeding when we went to press.

Du Pont's Dyestuffs Staff Reorganised

E. I. DU PONT DE NEMOURS & Co. announce that the development of American dyes has become such an important part of the company's activities that the dyestuffs department has been strengthened in order to deal more thoroughly with the technical and commercial problems which the new industry presents. F. W. Pickard, vice-president, has been relieved of his duties as a member of the executive committee to become general manager of the department with W. F. Harrington as assistant. C. A. Meade, vice-president and former general manager, who has been connected with the dyestuffs department since its organisation, and also M. R. Poucher, former director of sales, have been made executive staff officials. Both are directors of the company. Mr. Pickard has been connected with the du Pont explosives and chemical industries for twenty years. On October 30, 1918, he was elected vice-president and director of the company and was made a member of the executive committee. Up to the time of the recent reorganisation of the company, he represented the general sales activities on the executive committee. Mr. Poucher has been associated with the dye industry for many years and is one of the best known and most prominent men in the trade in America. When the du Pont Co. decided in 1915, to go into the manufacture of dyes, he joined the organisation and has been most actively engaged in the development of the industry in this country. He has held the title of director of sales, but because of the increasing need for his services in solving the development problems constantly arising, he has been relieved of the routine duties of that office, and Cesare Protto, his assistant, has been made director.

British Commercial Penetration in Germany

IT is announced from Berlin that the German tanning material industry is now under the control of a British company. The Forestal Land, Timber & Railway Co. acquired a majority interest in the Gerbstoff- und Farbwerke H. Renner Aktien Gesellschaft, at Hamburg, some time ago. In the meantime the British enterprise has been busy extending its hold on the German industry and is just reported to have acquired the majority share capital of the Rheinische Gerbstoff- und Farbholz Extraktfabrik Gerbr. Müller at Benrath. Both works represent the largest producers in this line. The British concern not only controls the extract industry in the producing countries, but also the sources of raw materials for extract production, formerly in the hands of the Renner company. Several years prior to the War, a German enterprise was established under the name of Deutsch-Koloniale Farb- und Gerbstoffgesellschaft, with a view to securing the independence of the German industry, but the unexpected result of the War meant the end of that colonial venture. The penetration of British capital into the German tanning material market is viewed with much concern by the German domestic leather industry, which is importing two-thirds of its requirements in raw hides and skins from South America and India.

Death of Dr. Charles Baskerville

THE death is announced, in his fifty-second year, of Dr. Charles Baskerville, director of the chemical laboratories of the City of New York College. He was the author of a number of text-books on chemistry, and was well known for his researches into rare elements, anæsthetics, and problems relating to industrial chemistry. While in New York he designed the large laboratory of the college and served as professor of chemistry and director of the laboratory up to the time of his death. He was a member and Councillor of the American Chemical Society, a Fellow of the American Association for the Advancement of Science, a Fellow of the Chemical Society, London, a member of the Society of Chemical Industry, the American Electrochemical Society, the New York Academy of Sciences, the Franklin Institute, and other bodies.

Recent Wills

Mr. John Delany, of Overdale, Settle, Yorkshire, a director of the Craven Lime Co., Ltd..... £238,053

Mr. William Arthur Carter, Gullane, East Lothian, a director of the Arizona Copper Co., Ltd., and other companies £26,572

Mr. Thomas Edwards Marchington, Fern Lea, Fairfield, Manchester, dyer and bleacher £100,841

Oil and Colour Chemists

Mr. H. M. Langton on "Studies in Saponification"

THE usual monthly meeting of the Oil and Colour Chemists' Association was held on Thursday, February 9, in London. Mr. Aston presided in the absence of the President (Dr. R. S. Morrell). A paper was read on "Studies in Saponification" by Mr. H. M. Langton.

Mr. Langton said that in saponification on a large scale the object was to obtain as large a yield of fatty acids as possible as well as of glycerine, both in as highly purified a state as possible. The resulting fatty acids were put to various uses, one being the manufacture of soap. The soapmaker, however, did not care to use fatty acids in the manufacture of soap, but preferred to start with the natural fat or oil. He boiled his fat and caustic soda together. On the Continent they were not quite so particular. Another use for fatty acids was the making of stearine candles and cloth oils which were used in the textile trade, whilst a certain quantity of fatty acids were used for polishes and in toilet preparation. An essential requisite in saponification was water or steam, but it was found that if one used water or steam the process of splitting was very slow, and it also required the reaction to be carried on under pressure and often at as high as 15 atmospheres. This resulted in a considerable discoloration of the fat. It was quite possible to split the fatty acids at ordinary temperatures. He had boiled off a sample of whale oil with an ordinary reflux condenser or Bunsen burner, and the operation was kept going continuously for twenty-four hours. After separating the oil from the water and boiling it, he had found that the free fatty acid content of the oil had risen from 15 to about 19 per cent. He admitted that that was very small, and was not a technical method of splitting, but it was practicable.

In a paper in THE CHEMICAL AGE in June of last year, Mr. Weston gave a useful summary of the methods used in splitting oils and fats, and Mr. Langton enumerated them as follows: (1) Acid saponification; (2) the use of bases, known as the autoclave process; (3) the Twitchell system; and (4) the fermentation process.

Acid Saponification

The first process was not used to any great extent. It consisted in adding about 4 to 6 per cent. of concentrated sulphuric acid to heated fat. The mixture was then heated to about 120°C. A certain amount of carbonisation took place and the sulphonated mass was run into boiling water and agitated by means of steam for several hours until it hydrolysed. The mixture then settled and the glycerine and acid settled out in the reaction tank or vessel, the layer of fatty acids being on top.

The Twitchell Process

As regards the Twitchell process, about twenty years ago a series of papers appeared in the *Journal* of the American Chemical Society showing that oils and fats could be saponified under ordinary pressure and at a comparatively low steam pressure by using as catalytic or accelerating agents substances such as naphthalene oleo sulphonic acid. That was the result of work done by an American chemist named Twitchell, and the process had taken his name. The following account was given of the process when worked on a large scale. The oil or fat—usually 8 to 10 tons—was boiled for two or three hours with about 2½ per cent. of its weight of concentrated sulphuric acid, and was then allowed to stand for four hours. The result was that any albumen or gelatinous matter present was either broken down or completely destroyed. The next stage was to carry out what was called the first saponification. In this the oil was heated by open steam, usually in a lead oak vat holding about 10 tons. This oil was mixed with about ½ per cent. of its weight of the Twitchell reagent, naphthalene oleo sulphuric acid and a small amount of sulphuric acid, and was steamed for about twenty hours with steam at from 60 to 80 lb. pressure. The great point about the Twitchell process was that the air must be excluded, and the operation carried out in an atmosphere of steam, and for that purpose the vat was usually fitted with a close-fitting lid. There was no trouble while boiling was going on, but after twenty hours the boiling was stopped and the contents allowed to settle. Then the lid was closed and through it was led a steam nozzle through which steam was played on to the mass in the vat, the object of which was to prevent discoloration. Then they saponified the fat to about 80 per cent., the fat being found on the top and the glycerine at the bottom, the glycerine being about 12 per cent. Tw. The process was then repeated, adding a little more reagent, for another five or ten hours, and then they found that the splitting had been carried to the extent of from 95 to 98 per cent.

Fermentation Process

As regards the fermentation process, that had its basis in the fact that most oils and fats, whether prepared from animal or vegetable sources, often contained a small percentage of free fatty acids at the very commencement, as if the process of saponification had already commenced. For this reason great care had to be taken with, for instance, palm oil, to prevent a rapid increase in the free fatty acid content in the natural state. Those who had occasion to buy palm oil would know that the natural product might vary in free fatty acid from 8 to 9 per cent. up to 70 per cent., and it had been proved that this decomposition of palm oil which took place actually in the process of manufacture was due to the action of the enzyme which was naturally present in the original substance. Nine months ago he had rather an interesting piece of work put in his way. An acquaintance brought to him at Liverpool a fresh palm fruit which was gathered at Waterloo, Freetown, Sierra Leone, on April 7, and was immediately put into chilled store and kept at 42°F. from April 9 until it reached Liverpool on the Elder Dempster boat on April 23. On the same day the fruit was examined in the laboratory, and it was found that the free fatty acid in the palm oil was only from 3 to 6 per cent.—extremely low. Various samples were kept in cold store for a period of from nine to ten weeks, and at the end of that time the amount of free fatty acid had increased to 10 per cent.

Autoclave Process

The most important technical process for saponification or splitting, however, he thought, was the autoclave process. Neither the Twitchell nor the fermentation process was greatly used, and the latter was rather a messy process. There was only one firm in the country which was successful in carrying out the saponification of oils and fats by fermentation. He proposed, therefore, to go into greater detail concerning the autoclave process, because that was the one with which he had had most experience. The autoclave was really like a boiler standing on its end, and was usually made of copper in this country and capable of withstanding 8 to 10 atmospheres pressure. The method he had adopted was to charge 3 tons of oil into a copper autoclave—which was about 20 ft. high—and to let in steam from a high-pressure boiler. At the bottom ofrthe steam pipe there was a sort of rose, through the holes of which the steam percolated into the heated mass, and that resulted in a stirring or agitating of the mixture. With the charge they put about 2½ per cent. of lime, made into a paste with water, after which the steam was pumped in. The work was carried on at 8 atmospheres pressure and it took from half an hour to an hour for the pressure to rise to 8 atmospheres. When it reached that point, the system got more or less stable until the end of the operation, which lasted about eight hours. At the end of that time the contents of the autoclave were blown out into a large lead-lined tank, in which they got a mixture of lime soap, fatty acids and undecomposed oil, together with glycerine water. In the case of whale oil, the glycerine was found to have a specific gravity 1.035, which corresponded to something like 25 per cent. glycerine, and the process was repeated and repeated until the wash liquor was below 1° Tw. when the glycerine left was not worth washing out.

Results of Experiments

Mr. Langton then gave an account of some work which he did between 1917 and 1919. The object of that was to get results which could be compared, as most of the previous workers had not carried out their investigations under comparable conditions. Various pressures were used and the reagents were not always the same nor was the percentage always identical. Consequently he determined to carry out a series of experiments, on a large scale, under definite and constant conditions so that the results could be compared. His experiments were always carried out at 8 atmospheres, and he always worked with the same percentage of base, viz., 2½ per cent. of lime or magnesia. A number of charts were shown illustrating the results obtained. In the case of tallow, he used 100 tons, in the case of whale oil, 300 tons; palm oil, 100 tons; and so on, and the total quantity of oil used in the experiments ran into two or three thousand tons. Taking Australian beef tallow, and working under the conditions mentioned, with magnesia as the base, it was found

that at the end of the first hour the saponification was 60 per cent., and at the end of two hours it was 90 per cent., the limit of about 98 per cent. was reached at the end of ten hours. Mutton tallow did not rise so rapidly as the Australian beef tallow, but it was a little higher at the end, the splitting being 98.7 per cent. as against 98.1 per cent. in the former case. With English beef tallow, using lime, it was seen that working with lime did not give so complete a splitting as in the case of magnesia, the average result being in this case 96.3 per cent. That was a graphical illustration of the fact stated in some books that tallows are saponified to a greater extent and more quickly with one base than another. It had been stated that lime was quicker than magnesia in this particular material—tallow—but this experiment did not support that view, nor did his general experience. It might, of course, be that the kind of lime or magnesia that was used had an influence, but the materials he had used were of very high purity.

With palm oil he got a reversal of the fact he had just mentioned as regards tallow and the use of lime. Saponification in this case seemed to be more nearly complete and more rapid when using lime than when using magnesia. The palm oil used in this experiment was a hard Niger palm oil containing about 52 per cent. of free fatty acids at the start, and it was seen from the curve that saponification was considerably more rapid with lime than with magnesia, although there was very little difference in the final result. With magnesia he got a splitting of 94 per cent, and with lime, 94½ per cent. This supported the views in some of the text-books. In this curve and in some of the others there was a sag after about five or six hours; between four and six hours there was scarcely any increase in the free fatty acid content, and it seemed that there was a tendency for equilibrium to be established at about that period. Some people were rather in favour of stopping operations at the end of that period and of blowing out the glycerine water from the autoclave and starting again. He had tried that, but it did not seem to be worth the loss of time. In the case of linseed oil, the saponification proceeded at practically the same rate whether lime or magnesia was used, and there was the same curious sag in the curve at about five hours. The extent of the saponification was an average of 92 per cent., using 200 tons in batches of 3 tons at a time. Palm kernel oil had a little over 60 per cent. free fatty acid at the start. In this case there was no deviation from the curve, and the sag at the end of five or six hours, noticeable in the other curves, was not to be seen here. The saponification, however, when using lime, was much less rapid than when using magnesia, and the result was nearer completion, the figure being 94½ per cent. with lime and 95.2 per cent. with magnesia. A No. 1 whale oil gave similar results, magnesia giving a better figure than lime. Other whale oils were used of higher quality but in all the curves there was a more marked sag than in the case of the other oils, and this again led the author to the conclusion that there must be some tendency towards equilibrium being set up round about the fifth and sixth hour of the operation. Using 180 tons of No. 1 whale oil, he got 95.7 per cent. splitting, using lime and using another batch with a slightly higher free acid content at the beginning, he got 93.9 per cent. The results were similar in the case of No. 2 and No. 3 whale oils. Summarising the conclusions from these curves, Mr. Langton said it seemed that tallows split the best; then came whale oils, palm kernel oil, palm oil and linseed oil. That was the order of saponification, using magnesia. Lime gave the best results in the case of palm oil, whilst with linseed oil there was nothing to choose between magnesia and lime.

The Chairman said the paper had given an able summary of previous work on the subject, but the most valuable part of it was that relating to his own experiments. If they could only have more experiments on the large scale of those carried out by the author, it would help a great deal in solving many factory problems.

Canadian Pulp and Paper Situation

In a report to the Department of Overseas Trade the British Trade Commissioner in Toronto states that, according to the Pulp and Paper Association, the Canadian production of newsprint during 1922 will total 1,000,000 tons. In regard to other pulp and paper products, Canada has reached the point where it could produce, in addition to newsprint, 138,678 tons of board, 60,000 tons of wrapping paper, over 58,000 tons of fine papers, and some 1,042,796 tons of pulp of various grades, giving the industry a total annual tonnage exceeding 2,300,000.

Polymorphism and Colour

At a meeting of the University of Birmingham Chemical Society on Monday, February 13, Dr. F. D. Chattaway, F.R.S., of Queen's College, Oxford, read a paper on "Polymorphism and Colour." He pointed out that Haüy, a French monk, towards the end of the seventeenth century, stated that each substance possessed only one crystalline form, but Mitscherlich's work on the salts of arsenic and phosphoric acids definitely proved that a single substance might have two different crystalline forms. This phenomenon was termed "Dimorphism." Substances which could crystallise in several systems were now generally known as "Polymorphous," the element sulphur being a typical example. Even in 1823 quite a large number of inorganic substances exhibiting polymorphism were known, but even at the present time the number of polymorphous organic substances was comparatively few. The following examples of the latter were cited: 1-Chloro-2:4-dinitrobenzene, benzophenone, *p*-bromoacetanilide and 2:4-dibromoacetanilide. Van't Hoff, who classified polymorphous substances, divided them into enantiotropic compounds where the two phases could be transformed reciprocally into each other, and monotropic compounds where only one form was stable under experimental conditions, so that the unstable form changed into the stable variety but the converse change was not realisable. Striking photographs of the transformation of calcium tartrate with six molecules of water of crystallisation to the modification containing four molecules of water were exhibited.

The researches of the lecturer on phthalyl phenylhydrazide and its various nitro-substitution products served to demonstrate the interesting phenomenon of polymorphism of organic compounds. Dr. Chattaway then dealt with the colour changes of these substances. In addition to mercuric iodide, which forms two differently coloured modifications, the lecturer had found in the cases of nitro-phthalyl hydrazides that the nitro-group was the determining factor. In conclusion he suggested that the colour was due to the attraction of groups in the same or in different molecules analogous to internal salt formation.

Possible Uses of Peat

Lecturing on Monday at the Cardiff Rotary Club, on "Peat: Its Uses and Possibilities," Mr. T. A. Goskar said there was very much more peat than coal in this country. The deposits in Ireland covered 15 per cent. of the surface, and were estimated at 5,000,000 tons dried; while there were also great quantities in Canada. Among minor products obtainable from peat he mentioned strong packing paper, moss and ammonia. With regard to oil fuel, he said it was estimated that if all the water could be extracted from the peat in the British Isles there would remain about 8,000 million tons of solid peat, which would contain about 30,000,000 gallons of crude oil, leaving about 18,000,000 gallons of fuel oil up to Admiralty specification. Further, there would be 2,600 million tons of charcoal. Mr. Goskar said that an average bog would give 16,000 to 20,000 gallons of alcohol per acre at a cost of 4d. a gallon. Other charges would bring it up to half-a-crown a gallon; but if the Government would only take a wider view of alcohol as a fuel for internal combustion engines he believed that the price could be brought down to a figure that would very seriously compete with petrol. This process, together with the generation of gas, seemed to be the likeliest economic production.

Affairs of the Herculin Glue and Compounds Co.

A meeting of creditors of Herculin Glue and Compounds Co., Ltd., 9/11, Richmond Road, Twickenham, Middlesex, was held on February 9 at the offices of the Official Receiver, 29, Russell Square, London. Mr. Thomas Courlay, the Official Receiver, said no statement of affairs was available, but the accountant to the company was preparing one. The liabilities seemed to be in the neighbourhood of £700, and the only asset disclosed was book debts of £100. The other asset had been sold under an execution. Business was still being carried on at the same address. A new company, which was in process of formation, was partly carrying on business in glue, but was selling other things as well. It was untrue that the glue was made by a secret formula. A resolution was passed to the effect that no application should be made to the court for the appointment of a liquidator other than the Official Receiver. Subsequently a meeting of the contributories was held, when a similar resolution was passed.

The Problem of Corrosion

Causes and Methods of Treatment

In a lecture, on Monday, February 13, at the Technical College, Huddersfield, before the Huddersfield Engineering Society (the President, Mr. F. J. Broadbent, M.Sc., A.M.Inst.C.E., in the chair), Mr. G. B. Jones, A.M.Inst.C.E., A.I.C., dealt at length with the problem of "Corrosion."

Importance to Engineers

Corrosion, he pointed out, was universal, and the subject should be of great interest to engineers. The principles of corrosive action were, however, often neglected in the training of engineers. There was a tendency during the last few years so to cheapen the production of materials that the quality suffered as regards resistance to corrosive attack, and careful estimates of first cost, maintenance, economic life, and the scrap value should be made when choosing materials of construction. It did not follow that the most resistant material was the best to use in any particular case. Unfortunately, also, good resistant materials were often expensive and of poor mechanical strength and properties.

The lecturer divided his subject into five parts: (1) The nature of corrosion, (2) the behaviour of metals, (3) special cases of corrosion, (4) corrosion of non-metallic materials, (5) prevention of corrosion.

In dealing with the nature of corrosion he said that water was the chief agent, and, generally speaking, the more chemicals were diluted with water the greater was their corrosive action. Oxygen was very active in causing corrosion, both the oxygen of the air and that dissolved in water. Acids and waste liquors also presented special problems. Slides were shown illustrating the various types of corrosion such as "complete," "selective," or "decay" of brass and cast iron, "pitting," &c., and the conditions influencing the attack were discussed. Oxygen was mentioned as the chief agent in "complete" corrosion. The electrolysis of dilute solutions of acids and salts caused selective attack; and external deposits of solid matter or segregation of impurities in metals caused "pitting."

The relative action of various common chemicals was briefly mentioned, and practical tests under the actual conditions of exposure were advocated. Laboratory tests were considered useful, but were often misleading, as conditions were difficult to imitate.

The general behaviour of cast iron and steel was explained, and it was shown that of the various alloy steels those of nickel (silver steel), chromium (stainless), and chrome-nickel steels alone gave comparatively corrosion-resistant metals. There was always a danger of difficulty with the mechanical properties of highly-resistant metals, and research was required as to the exact effect of heat treatment on corrosion properties. The striking effect of traces of impurities in single metals was brought out in discussing the properties of lead. This was contrasted with certain non-ferrous alloys which had very good corrosion resistance properties. There the presence of small quantities of a third or fourth metal improved the resistance—*e.g.*, 1 per cent. of tin or lead in certain brasses greatly improved their resistance to warm sea water.

With regard to special cases of corrosion it was shown that water was the agent in promoting the atmospheric rusting of steel, and that dissolved oxygen was the chief cause of corrosion of boilers and especially of warm water pipes, such as feed pipes, economisers, and water-heating systems. Apart, of course, from polluted water, dissolved salts in waters had little corrosive action in the absence of dissolved oxygen. Methods for removing this oxygen were briefly mentioned. The action of sea water or condenser tubes was also discussed, and it was shown that the nature of the corrosion—*i.e.*, "complete," "selective," or "pitting"—was of more importance than the total loss of metal in a given time. The attack on non-metallic materials, such as timber, concrete, bricks, and other ceramic materials, was only briefly mentioned.

Preventive Methods

The lecturer divided the means of preventing corrosion into seven groups.

(1) Non-corrodible materials. These, he said, often had the disadvantage of high cost and poor mechanical properties. The chief properties and uses of silica and ferro-silicons were mentioned.

(2) Lining or covering iron and steel with non-corrodible materials. The use of tiles, metal coatings, rubber, vulcanite and asphalt was mentioned. With regard to metal coatings it was pointed out that these divided into two classes—those electro-positive to steel such as zinc, aluminium, which protected by electrolysis as well as simply covering, and those electro-negative to steel such as lead, tin, nickel, which accelerated corrosion by electrolysis once the complete covering was broken.

(3) Enamel.

(4) Oxide finishing, such as blueing, the Bower-Barff process, &c.

(5) Lacquering and japanning.

(6) Painting and varnishing. Here the chief concern should be to get a coating impermeable to water.

(7) Electrolytic protection by using zinc blocks in boilers or the Cumberland Electrolytic system, where a current of electricity was passed from iron anodes and protected the metal parts of the apparatus by making them electro-negative.

An interesting discussion took place, in which Messrs. Lawton, Lunn and Lumb took part. After the lecturer had answered various questions, a hearty vote of thanks was accorded to him on the proposition of Mr. Henshaw, seconded by Mr. Lawton.

Chemical and Dyestuffs Industries

Dr. Carpenter's Tribute to British Chemists

Dr. Charles Carpenter, President of the South Metropolitan Gas Co., in his statement to the general meeting on Wednesday, February 8, referred to the position of the British chemical industry.

As regards dye products, he said, the story is a disturbing one. You will hardly be surprised at this if you have noticed that the largest dye-producing undertaking in Great Britain has passed its preference dividend. Chemical manufacturers in this country have had in the past to bear much criticism directed against their methods and processes as compared with their Continental competitors. It was, indeed, freely stated that the British temperament was, unsuited to the production of fine chemicals. This has been proved absolutely unfounded. British chemists—yes, and British workmen—can be trained to be as efficient as the Germans. But no industry on unsubsidized lines could continue in face of the competition which resulted from the unfortunate Sankey judgment. Personally, I find it difficult to differentiate between the ethics of a subsidy to encourage commerce by postal service and one to encourage industry by a chemical service, and I conscientiously believe that the best of both such services are essential to the welfare of the nation as a whole. Before leaving this subject I must bear testimony to the important work being carried out under the Dyestuffs (Import Regulations) Act, whereby the producers and users of dye chemicals are working together so well to reduce to a minimum our dependence upon foreign products. Two committees—namely, the Licensing Committee and the Development Committee—carry out between them the very important duties imposed by the Act, and on this machinery the extended re-establishment of the dye-producing industry in this country will largely depend.

Gasworks Residuals

Our residuals, Dr. Carpenter said, in a reference to this subject, are what might be termed high-temperature residuals, and possess their own special qualities and uses. We do not distil our coal to make low-temperature ones, because it would be unprofitable for us to do so. Our present retorts are responsible for a very small part of our total capital outlay, and we could readily scrap them and substitute low-temperature apparatus if there were any semblance of the working results proving satisfactory. At the present moment we are arranging to instal in our experimental works a process for purifying coal before it is converted into gas. Whether the process is commercially successful is a matter which only this semi-large scale production can determine. The improvement in the coke would be an obvious collateral advantage, but no opinion we may form is of any use unless based on experiment. We apply to our present coke production a systematic testing control, and as a result it stands well in the estimation of users, whether at home or abroad. Similarly our standard sulphate of ammonia has a high reputation, alike among our farmers and foreign buyers. Fortunately, we are now relieved from the obligation imposed upon us by the action of the Board of Agriculture of having to pool our production with inferior qualities marketed by a centralized organisation.

Institution of Rubber Industry

Rubber Mixes and Accelerators

At the meeting of the Institution of Rubber Industry held at the Midland Hotel, Manchester, on Monday, February 6, Mr. J. H. C. Brooking, M.I.E.E., presiding, a paper on "Rubber Mixes and the Question of Accelerators" was read by Mr. Joseph L. Rosenbaum, M.Sc.

Historical Survey

Dealing briefly with the historical aspect of the subject, the lecturer pointed out that it was in the researches relating to synthetic rubber that the foundation-stone of our modern knowledge of organic accelerators was laid. Synthetic rubber proved very difficult to vulcanise, and this was found to be due to the absence of the so-called impurities always present in natural rubber. When the traces of protein matter were extracted from natural rubber the remaining material proved very difficult to vulcanise, and when this protein was added to synthetic rubber satisfactory vulcanisation was easily obtained. As a natural consequence of this discovery of the marked accelerating properties of traces of organic basic compounds a search was made to see whether simpler artificially prepared organic compounds could not serve the same purpose.

The first practical result of this search was seen in a patent taken out by the Bayer Co. in 1912, in which they claimed the use of piperidine as an accelerating agent. This was followed by several similar patents, and finally in 1914 a patent was taken out claiming the use as vulcanisation accelerators of all organic basic compounds possessing a dissociation constant higher than 1 by 10^8. Since that time hundreds of other compounds had been proposed as accelerators, nearly all of them characterised by being basic products. Particular mention was made of the discovery by Peachey in 1914 of the accelerating properties of the nitroso derivatives of dimethyl aniline, di-ethyl aniline and similar compounds. These compounds were characterised by their accelerating properties being dependent upon the nitroso group and not upon the basicity.

The short historical survey concluded with a description of the zinc salts of complex organic compounds that had been proposed in America and Italy and also of the method of Dr. Schidrowitz of producing the catalyst in the rubber.

Mechanism of Action

Mr. Rosenbaum then dealt with the mechanism of action of accelerators. He showed that any heat effect produced by reaction of the organic catalyst and sulphur was very small indeed and could play but a very subsidiary part in accelerating the speed of vulcanisation. Although no general mechanism of action suitable for all accelerators could be formulated, there was no doubt that in the majority of cases reaction with sulphur occurred, and that complex sulphur containing bodies were formed capable of combining with the sulphur in the mixing, thus liberating it in a condition especially suitable for vulcanisation. The exact nature of this active sulphur was not known, but reference was made to the work of certain American chemists who held that it was thio-ozone—*i.e.*, a form of sulphur bearing the same relation to ordinary sulphur as ozone does to oxygen. Certain accelerators such as thiocarbanilide or hexamethylene tetramine or the complex thiocarbamate class only exerted their maximum efficiency in the presence of zinc oxide, whereas others such as nitrosodimethylaniline functioned quite well in a simple rubber mixing.

A remarkable fact with regard to these organic accelerators was that they exerted quite an abnormal effect upon the mechanical properties of the rubber as compared with the amount of sulphur that went into combination with the rubber. It would seem that these accelerators had some direct effect upon the rubber itself, but numerous experiments had failed to reveal any such action.

A *résumé* of the more important organic accelerators available to-day was given, and included the piperidine compounds and other thiocarbamate derivatives, thiocarbanilide, hexamethylene tetramine, aldehyde ammonia, *p*-nitrosodimethylaniline, *p*-phenylene diamine and many others.

Discoveries During Research

Mr. Rosenbaum then described a group of remarkable accelerators he had discovered during his research work in the laboratories of the Hooley Hill Rubber and Chemical Co. The colour bases of the basic dyes were investigated, and it was found that in many cases not only did they possess very marked accelerating efficiency, but that the colour they produced in the vulcanised mixing persisted during vulcanisation even at high temperatures and in the presence of excess of sulphur. A striking case in point was that of methyl violet base. Then other colour bases were discovered which were very good accelerators, but the colour of which was completely destroyed on vulcanisation. Auramine base was an example of this class. Other bases were found which had very good colouring properties, but which only accelerated to a very insignificant extent. Finally, it was found that all the colour bases of the basic organic dyestuffs accelerated the vulcanisation and/or coloured product. This discovery formed the subject matter of British Patent 141,412 of 1919.

Dealing with the question of the practical use of accelerators, Mr. Rosenbaum pointed out that the best commercial results could be obtained by diminishing the quantity of sulphur used in the mixing when an accelerator was used. This point had been realised in America, which country was six to eight years ahead of Great Britain in the technology of rubber vulcanisation acceleration. Accelerators, whilst particularly valuable for their time, steam, and labour-saving qualities, had several secondary advantages which were not sufficiently realised, such as the prevention of sulphuring up or blooming, the improvement of the physical qualities of the rubber, and the improvement in ageing properties. They could also be used in the manufacture of the rubber sheaths for electric cables where it was necessary to have no free sulphur at all in the mixing.

With regard to the toxic properties of accelerators, Mr. Rosenbaum pointed out that these had been rather exaggerated, and showed from his own experience with the use of Accelerene (*p*-nitrosodimethylaniline) that by efficient supervision and proper selection of workmen troubles from skin rash and skin irritation could be reduced to a negligible minimum.

A discussion followed, in which Messrs. W. C. Smith, H. Hatton, M. A. Greenberg, T. F. Linton, J. Bowyer, F. J. S. Gray, and L. Caisman took part.

Chemical Analyses of Seepages

The Significance of their Interpretation

At a meeting of the Institution of Petroleum Technologists, held at the Royal Society of Arts on Tuesday, Professor J. S. S. Brame, presiding, Mr. J. E. Hackford, F.I.C., read a paper on "The Significance of the Interpretation of the Chemical Analyses of Seepages."

In the course of his paper Mr. Hackford said it was remarkable that, generally speaking, various classes of oils were isolated in various localities, for example, we had one type of oil in Pennsylvania, another in Borneo, and another in Mexico. The question arose as to why we did not obtain the Mexican type of oil in Russia, or the Borneo class of oil in Mexico. Again, in some single fields, the oils were of practically the same nature and gravity, whilst in others, particularly those of salt-dome formation, very different varieties of the same class of oil were found in the same field. On the flanks of a salt dome, oils of a low specific gravity were often found, and in the case of the Mexican salt domes it was true that the specific gravity varied as the thickness of the crust of the dome and the sulphur content thereof. The author gave a selection of analyses from a typical dome formation in Mexico. The salt water obtained from the dome contained very appreciable quantities of iodine.

Variation of Sulphur Content

The sulphur and the asphalt content varied directly as the specific gravity. From the great divergency in the sulphur contents of oils, it would be seen that it was impossible for them to have as many different origins as there were different oils. The theory put forward to explain the phenomena was as follows: It was assumed that the oil, coming from one direction, encountered the dome and stored itself in the natural reservoir of dolomite enclosed by the overlying marls. In those places where the thickness of the dolomite was appreciable and where the sulphur content of the same was correspondingly large by bulk, sulphur was absorbed by the oil, resulting in the formation of asphaltum, causing a corresponding increase in the specific gravity of the oil. In those places where the dolomite was thin and, consequently, the bulk of the sulphur present in it small, little

change had taken place in the oil itself. It was then seen that, in an oilfield containing oils of varying gravities and properties, the variations were directly traceable to local geological conditions.

It was generally found that on a large anticline the qualities of the oil were practically the same, but, let there be a fault, then the oil of the faulted area was always different from the bulk oil existing on the anticline, and was generally much heavier. It was found to contain a much larger percentage of oxygen in the asphaltene fractions than in the corresponding fractions of the oil.

Should a number of samples of oil from one field be given to the chemist, he would be in a position from the analyses of these samples and/or seepages accurately to state the geological structure from which the oil had been derived, and also to state whether any of the samples were found on a faulted zone.

The outstanding features of Mexican oils were : (1) The high sulphur content ; (2) the asphaltic nature ; (3) the minute nitrogen content ; (4) the practical absence of aromatic compounds ; (5) the multiplicity of the elements present in the ash of the oil.

Derivation of Mexican Oil

Marine plants had the power of absorbing various elements from sea-water, and, therefore, if Mexican oil were derived from the former, the ash should be characterised by a diversity of elements. Silica, vanadium, nickel, tin, lead, calcium, magnesium, iron, aluminium, sodium, and titanium were present. Gold was present in traces. The saline waters accompanying the oil as tested from wells from Dos Bocas, to the Isthmus of Tehuantepec, contained iodine. From the above evidence, it appeared most probable that Mexican oil was derived from marine vegetation. If these premises and conclusions were true, it was quite understandable why similar conditions did not obtain all over the world.

Petroleum oils such as occurred in Nature were clearly not derived from coal ; but, given a quantity of vegetal material, petroleum might be produced under a given set of circumstances if no cellulose was present, and coal would be formed if the vegetal matter contained sufficient cellulosic matrix to form a sponge.

All mineral oils contained aliphatic hydrocarbons, and in consequence the nomenclature was based on that fraction of the oil present which formed its distinguishing characteristics. The author divided oils into the following classes : Aliphatic oils, aromatic oils, naphthenic oils, naphthylenic oils. Each of the above might contain either oxygen or sulphur derivatives of the same.

Liquid and Solid Seepages

Dealing with the interpretation of solid and liquid seepages, Mr. Hackford took as an example a sample of solid seepage which was found in the laboratory to possess the following characteristics : Asphaltum, 65·5 per cent. ; asphaltenes, 46·9 per cent. ; diasphaltenes, 18·6 per cent. ; oil and paraffin wax, 34·5 per cent. ; fixed carbon, 32·4 per cent. ; and sulphur, 7·27 per cent.

By placing a solid bitumen in its chemical category, said Mr. Hackford, we derived commercially valuable information, which could not be ascertained were the bitumen physically classified, or merely classified under the chance name of the discovering prospector.

In conclusion, the author said he had endeavoured to show how the *class* of the oil existing underground (as yet undrilled), was determined by interpreting the analyses of such visible evidence as solid and liquid seepages, or even gas. The following up of this method of interpretation had entailed the establishment of many new laboratory methods.

Discussion

In the discussion which followed Professor Brame referred to the provocative nature of the paper. In regard to the analysis of natural gases, he felt that most of these analyses should be regarded with a certain amount of suspicion.

Dr. Lessing said one of the most remarkable features of the paper had been the way in which the author had shown that oils had no one exclusive source of origin. He thought that if it were possible to get more information regarding the inorganic constituents of oil and to compare this with similar information relating to the vegetable or mineral constituents from which it was suspected to have come, Mr. Hackford's theories would probably be considerably strengthened.

Dr. Ormandy said that all chemists who had had to deal with asphaltic bodies would appreciate the difficulties which had existed in regard to nomenclature.

Railway Rates Revision

Amended Classifications for Oils and Fats

At the Royal Courts of Justice on Tuesday the Railway Rates Advisory Committee dealt with traders' objections in regard to the railway companies' classifications for oils and fats. The chairman (Sir Francis Gore-Brown) announced that the following offers had been made by the railway companies and agreed to by the traders : Petroleum tailings (wax tailings) as wax, paraffin to be amended to read "Petroleum tailings from first distillation of petroleum," Class 9 ; rosin, previous classification Class 12, to be in Class 11 ; and tallow, vegetable (for soap or candle-making), in casks or iron drums, to be Class 11 ; "in sacks or mats," Class 11.

Mr. Oldham, of the Vacuum Oil Co., represented the whole mineral oil industry in England, Scotland and Wales, with the object of avoiding duplication of evidence. Dealing with oils in Class 11, owner's tank wagons, he considered Class 7 to be a fair classification. Mr. Pike (for the railway companies) raised the question of empty haulage. The chairman said these oils would remain in Class 10, but the committee had taken note of the railway companies' statement that the exceptional rates would be continued as heretofore.

In regard to "oils not dangerous," Mr. Lees (United Kingdom Soap Manufacturers' Association) thought that the proposed new classification would do away with the exceptional rates. The traders would like four-ton lots to be in Class 9 and ten-ton lots in Class 8. They had not objected to two-ton lots being in Class 11. Mr. Pike said the railways thought they had met the traffic as well as they possibly could. The chairman said that the proposals of the railway companies would stand.

Mr. Oldham dealt with "oils, mineral, lubricating," and "grease in tins in cases." The chairman ruled that lubricating oils, when sent in tins, would be in Class 12. The entry would be "oils, lubricating, mineral, in tins of less than 4 gallons in cases."

Mr. Oldham next dealt with "fuel oil," and said that the principal traffic was in owners' tank wagons. The traders asked Class 3 for owners' tank wagons, and Class 8 for casks or iron drums. The traffic was greatly restricted at present owing to the high classification. The only objection they raised to "gas oil" was "consigned direct to gasworks." Gas oil was to-day, he believed, used for other purposes. The term "mineral oil residuum for grease-making" was too vague. He thought that "petroleum" and "shale, crude," were two items in a different category. "Petroleum, burning," had now been placed under the heading "oils as under, not flashing below 150°F." The traders asked for Class 9 for casks or iron drums. The chairman announced the following decisions : Creosote pitch mixture would be struck out, as the parties were content it should be. Anthracene would remain ; owners' tank wagons, 8 tons, Class 7 ; casks or iron drums, Class 10. Petroleum shale, crude oil, would remain in the same way in classes 7 and 10. Paraffin and petroleum, burning, would be as proposed by the companies, in owners' tank wagons, Class 10 ; casks and drums, Class 11. Crude shale would be in Class 2. Paraffin scale would be in Class 11. The committee also decided that tapers and candles should be in Class 11.

Major-General Long dealt with margarine, and the representative of the Federation of Grocers' Associations with lard and lard substitutes, and after hearing Mr. Pike, the committee decided that the companies' proposals would stand.

Major-General Long having spoken regarding "oleo stearine and premier jus," the committee thought there was not sufficient reason for making any alteration in regard to the former, and premier jus would be included.

Mr. Rhodes (Messrs. G. W. Goodwin & Sons) supported the objection regarding "oil, citronella." The railways had proposed Class 20. The decision was that it should remain as before.

Major-General Long dealt with "glycerine, crude, in casks or iron drums," and said the traders asked the companies to put in "in tins and cases," because often this was a more convenient form of packing.

The chairman said that it should be the same in tins. The committee also decided that "tooth-powders and paste" should be in Class 19.

On Wednesday the committee decided that oil cake should be placed in Class 8, and that the railway company's proposals in regard to oils for leather dressing, soap, resin, and distempers should stand.

January Trade Returns

An Encouraging Recovery in Export Trade

WHILE indicating that the state of our overseas trade, measured by the standards of more stable periods, continues far from satisfactory, the Board of Trade returns for January reflect a slow, but encouraging improvement in the general trade position. Exports during January were the largest since March last, imports were substantially smaller (the lowest recorded for five years), and re-exports have fallen by £744,000. As a result, the adverse balance of trade, which in December amounted to £16,733,000, has dwindled to £4,882,000, a figure which is probably without precedent in recent years. The following table gives the figures for the past three months:

	Imports.	Exports.	Re-exports.
	£	£	£
November, 1921 ..	89,258,795	62,894,842	9,823,199
December, 1921 ..	85,312,081	59,374,750	9,203,591
January, 1922	76,488,231	63,146,949	8,458,866

Imports of chemicals, drugs, dyes and colours amounted in value to £764,482, exports to £2,014,794, and re-exports to £119,716.

Chemicals and Drugs

Decreases are indicated in imports of many chemicals, the most striking reductions being in sodium nitrate, borax and nickel oxide. Detailed figures of increases are given below, with the December figures in parentheses, the amounts being in hundredweights, unless otherwise stated: Acetic acid (including acetic anhydride), 328 tons (243); bleaching materials, 3,327 (2,542); calcium carbide, 57,197 (55,946); crude glycerine, 3,606 (2,280); distilled glycerine, 828 (503); potassium nitrate, 9,962 (8,288); and sodium compounds other than nitrate, 14,418 (11,571). The decreases, similarly compared, were: Tartaric acid (including tartrates, not elsewhere specified), 1,270 (2,221); borax, 50 (4,100); red lead and orange lead, 1,503 (1,701); nickel oxide, nil (4,135); sodium nitrate, 45,880 (163,061); cream of tartar, 115 (412); and zinc oxide, 241 tons (390).

Further Recovery in Sodium Compounds

Exports during January were, on the whole, larger than in the previous month. Tar oil, creosote, &c., which in November reached the phenomenally low figure of 28,672 gallons, and which improved in December to 70,853, now stand at 962,198 gallons. Despite a heavy decrease in sodium sulphate the total quantity of sodium compounds has increased by over 300,000 cwts., the improvement being mainly due to a large increase under sodium carbonate, soda crystals, soda ash, and bicarbonate. The following figures show in detail the products the exports of which show increases over the December figures; the latter are given in parentheses, and the amounts are in hundredweights unless otherwise stated: Sulphuric acid, 909 (857); tartaric acid, including tartrates not elsewhere specified, 1,005 (283); ammonia chloride (muriate), 696 tons (268); ammonium sulphate, 16,854 tons (12,318); bleaching powder, 14,872 (9,135); carbolic acid, 10,188 (7,880); naphtha, 2,206 gallons (1,471); naphthalene, 2,541 (1,813); tar oil, creosote, &c., 962,198 gallons (70,853); copper sulphate, 5,513 tons (2,491); crude glycerine, 4,513 (2,051), distilled glycerine, 4,019 (2,316); sodium carbonate (including soda crystals, soda ash and bicarbonate), 691,958 (358,108); and sodium caustic, 182,534 (116,089). The following show decreases: Benzol and toluol, 1,597 gallons (51,274); coal-tar products not elsewhere specified, 13,119 (17,265); potassium chromate and bichromate, 566 (1,628); potassium nitrate, 676 (943); sodium chromate and bichromate, 2,521 (3,484); sodium sulphate, including saltcake, 26,886 (79,297); sodium compounds, other sorts, 54,601 (58,248); and zinc oxide, 73 tons (140).

Dyes and Dyestuffs

Dye imports during the month under review were almost negligible, with the exception of alizarine. Decreases are noted in intermediates (including aniline oil and salt and phenyl-glycine), nil, against 4 cwt.; synthetic indigo, nil, against 63 cwt; coal tar dyes, other than alizarine and synthetic indigo, 3,066 cwt., against 3,619; and natural indigo, nil, against 66 cwt. Alizarine was imported to the extent of 2,017 cwt. as compared with 12; while cutch imports totalled 3,257 cwt. as against 2,456. There was a slight recovery in exports of dyes, the total being 9,494 cwt. as compared with 9,161. To this total, coal tar products contributed 4,871 cwt. against 5,921; other sorts were 4,623 cwt. against 3,240.

Imports of painters' colours and materials were slightly greater, the comparative figures for January and December being: Barytes, ground (including blanc fixe), 50,851 cwt. (35,251); white lead (basic carbonate), 8,042 (9,201); and painters' colours, &c., other sorts, 35,525 cwt. (41,138). Exports under this heading, at 92,553 cwt., were 13,631 cwt. more than in the preceding month.

Scientific Instruments and Glassware

Scientific glassware (except tubing and rod) was imported to the value of £4,518; while 150 cwt. of glass tubing and rods valued at £715, were imported. Exports of tubing and rod amounted to 33 cwt., of the value of £454; while those of other scientific glassware amounted in value to £5,174. During January we imported 94,651 gross of glass bottles and jars valued at £81,715 (compared with 89,218 gross, valued at £85,957), and exported 31,973 gross, of the value of £45,128, as against 22,840 gross, valued at £35,440. During the month we imported £29,753 worth of complete scientific instruments and apparatus (except electrical), the total being made up as follows: Germany, £8,799; France, £1,836; United States of America, £10,661; and other countries, £8,457. Exports under this heading amounted in value to £79,860. British India was, for the third consecutive month, the largest individual purchaser.

Coal exports were 288,227 tons less at 4,020,935 tons, and were worth £4,783,539 as against £5,365,961.

Gas Light and Coke Co.

Mr. Milne Watson on Low Temperature Carbonisation

SPEAKING at the annual meeting of the Gas Light and Coke Co., held at Horseferry Road, Westminster, London, on February 10, Mr. D. Milne Watson (the governor of the company) said that gas undertakings were constantly being attacked because they did not carbonise coal at a low temperature, and it was assumed by advocates of the latter method that gas undertakings were antagonistic to low temperature carbonisation. The gas industry, as a whole, he said, was not antagonistic to any particular method, and he could safely say that there was no prejudice against low temperature carbonisation as such. It was, no doubt, an excellent method of obtaining an increased production of liquid by-products, and he could well believe that in some cases it might be useful in dealing with coal at the pit heads. The principal reason why they did not adopt this method was that it was not an economical gas-making proposition, but a process that had for its first objects the production of increased quantities of tar oils and free-burning coke, gas being the residual of manufacture. This was essentially different from their own process, which was for the purpose of obtaining the maximum quantity of gas from the coal. The high-temperature process produced 70 therms per ton of coal, while the low-temperature production of therms was rarely more than 40. To compensate for the decreased efficiency of gas production by the low-temperature process they would, were it adopted throughout their works, need to purchase nearly double the amount of coal they now carbonised, which was about 2,000,000 tons per annum. New carbonising plant would be required to replace that now in use, necessitating the expenditure of very large sums of money.

Alby United Carbide Undertaking

Tyssefaldene Power Co. Buys Odda Factories

IN accordance with the arrangements disclosed at the extraordinary general meeting of the company in December last (*see* THE CHEMICAL AGE, Vol. V., p. 838), the foreclosure sale of the Odda factories was held on February 11, when the Tyssefaldene Power Co. purchased the factories for 50,000 kroner. It will be remembered that, according to a statement made in December last, the purchasers were owed a large sum of money by the Alby Co., and that the Tyssefaldene Co., together with the English syndicate, intended to restart the factories within six months for the production of ammonium sulphate. According to an agreement reached at the December meeting of the Alby Co., an adjourned extraordinary general meeting will be held not later than February 28.

The Geddes Penknife

By Ernest J. P. Benn

THE Geddes Report and the extraordinary fuss that has been made about it is only another illustration of an old fact so continuously and conveniently forgotten, and so regularly and skilfully used by the politicians—the shortness of the public memory. By means of one of the cleverest Press campaigns (and Whitehall is by now very skilful in the manipulation of the Press) the public has been worked up into a state of excitement and wonder, until at the end of it all it is expected to regard a cut in national expenditure of £75,000,000 as "historic." Cuts in public expenditure, however small, will be welcomed by those responsible for trade and industry, but it is very important that we should not lose our heads, and that we should get our figures right and our ideas into true perspectives.

A Comparison with the Gladstone Standard

It is useful to remember that Mr. Gladstone in introducing his last Budget entered upon an elaborate apology for a national expenditure amounting to 95 millions, and expressed the fervent hope that that sum might never be exceeded. Since those comparatively recent days, public expenditure, national and local, has been worked up until it touched, three years ago, a figure twenty times the size of that which caused so much searching of heart to Mr. Gladstone. It may be objected that it is hardly fair to go back to that time, and I should not be inclined to quarrel with that objection, but I do suggest that it would be useful if we could compare the value which we as a nation secured for Mr. Gladstone's £95,000,000 with the value which we are now obtaining for rates and taxes which are very little short of £1,500,000,000. The much advertised Geddes Axe offers a reduction of £75,000,000, a figure which will, of course, be very much reduced when all the vested interests threatened have had full opportunity to work up their respective agitations. Traders and tax-payers generally will take the view that the much-advertised axe is in fact nothing but a small penknife scratching at the surface of the greatest of modern abuses. If every economy suggested by the Geddes Committee were accepted we should still be left with a national expenditure somewhere between four and five times the size of our pre-war Budget.

In a word, what Sir Eric Geddes has done is to knock down public extravagance by 7½ per cent. The tradesman who could show no better reduction than that on the highest war-time figures would have to close his shop. The process of deflation, in so far as it has been left to individuals to accomplish, has gone ahead with remarkable rapidity. This is seen in the cost of living index figure, the war-time advance having been reduced by half. How is it possible for the Government to suggest that wages and prices must continue to fall when everything which they themselves control, from a postage stamp to a Labour Exchange, is still charged up on the highest war price scale?

It is necessary to be very explicit, very definite, and in fact very rude, on this subject. There is a real danger that the public will be doped into the habit of regarding war-time taxation as normal, and find itself really happy over a paltry 7½ per cent. reduction. No single Geddes Committee will suffice to bring us back to common sense and prosperity, and while, therefore, the trading community will, of course, be grateful for the reduction now offered, we must regard it as only a small step in the right direction, and no relaxation must be allowed to enter into our efforts to go the whole way.

Futility of Labour Exchanges

The utter futility of Labour Exchanges has repeatedly been pointed out in these columns, and a warning was given that other work would be heaped upon these exchanges in order to cover up the complete failure of their original purpose. There was never any reason why unemployment insurance, like health insurance, should not be administered by the post offices, or the provident societies, or even by the trade unions. The public does not even now realise how greatly the Labour Exchanges have contributed to the abuse of the dole. Hundreds of green buildings, placarded with notices about unemployment pay, constitute a positive invitation to those who are not gifted with more than the average amount of energy, to qualify for receipt of out-of-work pay. The dole has, no doubt, been very useful to many thousands of workers unfortunately out of a job, but it has been even more useful to many thousands of limpets who constitute to-day a vested interest in unemployment. What is true of Labour Exchanges is true of many other Government departments. The best that can be hoped of the Geddes Report is that it will set a fashion and that the public enthusiasm for economy will at last begin to be real and effective.

Economy is not altogether a happy word in this connexion. To the bulk of the electorate it means no more than saving the pockets of the wealthy; that is the most unfortunate aspect of the whole question. Because there are only 2,000,000 taxpayers the rest of the people are prone to think that the talk of economy is an agitation promoted by the wealthy few. Public expenditure is not, after all, so much a matter of economy as of value for money, and we must sooner or later reach the stage when it is generally recognised that the most ineffective, the slowest, and the most extravagant way of securing any object is through public action. We are all in favour of health, and the politicians and the bureaucrats yell the word until we are almost inclined to believe that there is some direct relation between the actuality and the millions which are squandered in its name.

Social Progress

It would not be difficult to show that the rate of social progress has been in inverse ratio to the rate of public expenditure. Before the war, thanks to private enterprise and personal initiative, we were achieving general social advancement at a rate which few paused to realise. Within a few days we flew across the Channel, we cut the Atlantic journey down to four days, and we knocked ten minutes off the trip from London to Liverpool. Every day witnessed some big advance in human knowledge and personal comfort. The cost of living fell so low as to be a cause of alarm. The war necessarily arrested all this good work, and the determination of the politicians to usurp the place of the individual has, since the war, in the name of reconstruction, prevented its resumption.

Housing gives us a perfect example of the sort of value which we get from money when it is spent through the public purse. Parliament and the State never tackled a job in more serious mood than they did the housing problem. Everybody was determined to have a land fit for heroes and every effort was made to achieve that object. What is the result? The Geddes Report tells us. For every sixteen pounds' worth of housing provided, there is a deficit of £59, £4 of which comes out of the pocket of the ratepayer, and £55 from the unfortunate taxpayer. I do not doubt that if other public services could be measured with equal precision similar results would be shown; the fact is, of course, that Government action is the negation of economy, and should never be brought into play unless, and until, every other possible means of achieving the purpose in view has been exhausted.

We are all in favour of education, but is there anybody willing to argue that the quality of education to-day is four times better than a few years ago? And yet that is the measure of its cost. What actually happens? The politicians shriek education and dip deeper and deeper into our pockets. The most obvious result is, as pointed out by a correspondent in the *Times*, an office full of clerks busy sending forms from Whitehall to country parishes to inquire whether J. A. Smith who attended on Tuesday is the same as John Smith who attended on Thursday, and if so why he is not so described.

It is, of course, impossible to measure the exact value of services rendered by institutions such as the Board of Trade, or the Department of Overseas Trade, to our commerce and industry. From a somewhat wide experience extending over thirty years, I can at least testify that I have never yet met any merchant, tradesman, manufacturer, or workman who acknowledged having received any benefits from the operations of these institutions. It would be very instructive to compare the operations of the Department of Overseas Trade with a body like the Federation of British Industries, and I do not doubt that such an investigation would show that the latter gives better value for a thousand pounds than does the former for a million.

The Geddes Report is a lengthy document, but every line of it should be read by every serious citizen. Every paragraph could be expanded into a chapter, and every point will emphasise the argument that public action must necessarily be wasteful and is usually ineffective. The acceptance, therefore, of the Geddes Report *in toto*, and the multiplication of it by three or four would not only reduce national expenditure, and save us from national bankruptcy, but much more, it would clear the way for a resumption in earnest of the world's work by the men and women who understand how to do it.

Chemical Matters in Parliament

Safeguarding of Industries Act

In a written reply to Mr. Mosley (House of Commons, February 9), Mr. Baldwin said it would be impossible, without prolonged and minute investigation, to state the number of articles which had never been manufactured in this country which had been included in the schedule of articles chargeable with duty under Part I. of the Safeguarding of Industries Act. He pointed out that the object of Part I. of the Act was to encourage the development of the industries to which it related and the extension of their range of production to varieties of goods not hitherto produced in this country. It was too early to form a definite judgment as to the effect of the Act in this direction, but he was satisfied that the desired extension was taking place.

Repeal Bill Presented

In the House of Commons on February 10, a Bill intituled The Safeguarding of Industries Act, 1921 (Repeal) Bill, "to repeal The Safeguarding of Industries Act, 1921," was presented by Mr. Alexander Shaw, supported by Mr. John Wallace, Sir Charles Sykes, Captain Cook, and Sir Evan Jones. The second reading was ordered for Friday, April 7.

Captain Wedgwood Benn (House of Commons, February 14), moved for leave to introduce a Bill to repeal the Safeguarding of Industries Act, remarking that there was no evidence that it had resulted in building up the chemical trade of this country. The motion, which was opposed by Sir Richard Cooper, was rejected by 170 votes to ninety-two.

Effect of Duties on Prices

Replying to Mr. T. Thomson (House of Commons, February 13), Mr Baldwin said that such statistics as were available showed that in many cases the prices of commodities subject to duty under Part I. of The Safeguarding of Industries Act were now lower than they were before the imposition of such duties, and the increases were infrequent.

Scientific Apparatus

Mr. Briant (House of Commons, February 13), asked the President of the Board of Trade whether any complaints that scientific apparatus essential for research work was difficult to obtain, owing to the operation of the Safeguarding of Industries Act, had reached his department.

Mr. Baldwin said no complaints had been made to his department, but he understood that certain complaints had been received by the Department of Scientific and Industrial Research, and that their validity was being investigated.

Part II. Orders

Mr. Betterton (House of Commons, February 13), asked the President of the Board of Trade whether any orders had been made under Part II. of the Safeguarding of Industries Act; whether any inquiries have been instituted under this Part of the Act; and whether in any such cases, if any, the Committee have reported.

Mr. Baldwin said no orders had yet been made, but eight complaints had been referred to committees constituted for the purposes of Part II. of the Act. In one case the committee had reported, and their report was under consideration. There had been no avoidable delay in bringing Part II. of the Act into operation.

Objections to Scheduled Articles

In reply to Mr. Briant (House of Commons, February 13), Mr. Baldwin said the Board of Trade had received, under Sec. 1, Sub-sec. 5, formal notices of complaint in respect of some 380 commodities included in the Safeguarding of Industries list. About 360 of these commodities were covered by complaints from two associations of traders. Complaints in respect of exclusion from the lists had been received in regard to some 160 commodities, of which about 150 were covered by a complaint from an association of manufacturers. It was not certain, however, that all these complaints would be proceeded with, and so far, formal statements as to the precise grounds on which the complaints were based had been furnished in respect of only sixteen commodities. He hoped it would be possible to expedite future hearings and that when a comparatively small number of representative cases had been decided it might be practicable to determine the other cases rapidly.

The Santonine Judgment

Dr. Murray (House of Commons, February 13) asked the President of the Board of Trade whether he had fully considered the bearings of the judgment given by the Official Referee in the case of santonine, which was held by him to have been improperly included in the lists issued by the Department, and which was removed from those lists in December last; whether he was aware that the judgment given would similarly delete from the lists by implication a large number of other articles; whether he intended to put taxpayers of the country, as well as the complainants in the case of the other articles in question, to the expense involved in contesting numerous disputes already decided in principle by the judgment referred to; and what had been the costs incurred in respect of the proceedings before the Referee.

Mr. Baldwin, in his reply, pointed out that the Referee specifically stated that he would not regard the principles mentioned by him in giving his judgment in respect of santonine as binding him in respect of other cases. In these circumstances, it appeared necessary that a number of other cases should be decided before the Board could scrutinise the lists in the light of any general principles enunciated by the Referee. He had no information as to costs incurred by parties other than the Board of Trade, whose expenses, including the fees of the Referee, in respect of all cases heard up to date, amounted to something less than £700.

Duty on Gas Mantles

Mr. Kiley (House of Commons, February 13) asked the President of the Board of Trade the reason for the delay in putting into operation the decision of the Referee under the Safeguarding of Industries Act, announced nearly two months ago, regarding the imposition of a duty of 33⅓ per cent. on gas mantles which contained certain commodities which were liable for duty.

Mr. Baldwin said the Referee had not yet made his award in respect of gas mantles, and consequently there had been no occasion for the Board of Trade to take any action.

Government Pledges

Mr. C. White (House of Commons, February 13) asked the President of the Board of Trade whether he had knowledge of any pledges given during the War to protect special industries and, if so, what was the nature of the pledges.

Mr. Baldwin said the nature of these pledges was fully discussed during the passage of the Safeguarding of Industries Bill, and of the Resolutions which preceded it.

Imports of Chemicals and Dyes

In reply to questions by Mr. Newbould and Mr. Doyle (House of Commons, February 13), Mr. Baldwin circulated tables showing the tonnage (where available) and value of certain commodities imported from Germany into the United Kingdom during 1913 and 1921 respectively. The statement included the following figures: 1913, dyes and dyestuffs obtained from coal tar, 17,148 tons, valued at £1,731,000; 1921, 2,123 tons, valued at £797,576; 1913, chemicals other than drugs and dyestuffs to the value of £1,864,000; 1921, £1,079,982.

Cardonald Factory Explosions

Mr. Young, in a written reply to Mr. Neil Maclean (House of Commons, February 9), said, in regard to explosions which occurred in June last at the National Filling Factory, Cardonald, that no formal inquiry was held by the Disposal and Liquidation Commission, as from preliminary investigations it did not appear that any liability lay with the Commission. No compensation had been awarded by, and it could not be traced that any claim had been preferred against the Commission.

Merchandise Marks Bill

In reply to Mr. G. Terrell (House of Commons, February 13), Mr. Baldwin said it was the intention of the Government to introduce this session a Bill based on the recommendations of the Merchandise Marks Committee, but it was not possible as yet to name a date for its introduction.

Zinc Concentrates

Replying to questions by Mr. Lambert (House of Commons, February 13), Mr. Baldwin said he would shortly make a full statement in regard to the purchase of zinc concentrates in connexion with a Supplementary Estimate.

From Week to Week

MR. N. TAYLOR has been appointed assistant manager of Hopol, Ltd., Sandbach, Cheshire.

Germany is reported to be making great efforts to capture the Italian COPPER SULPHATE market.

MR. J. R. MCINTOSH has resigned his position as vice-president of R. W. Greeff & Co., Inc., of New York.

PROFESSOR A. G. PERKIN will deliver his second lecture on "Dyeing: Ancient and Modern" at the Royal Institution on February 23 at 3 p.m.

The annual dinner of the Chemical Industry Club, London, has been fixed for Friday, November 24. The chair will be taken by Mr. A. G. Craig.

The death occurred on February 11, at the age of sixty-two, of MR. FRANK M'DONALD, who was for many years with Price's Candle Co., of Bromborough Pool.

PROFESSOR H. E. ARMSTRONG will read a paper on "The Indigo Situation in India," at a meeting of the Indian Section of the Royal Society of Arts on March 24.

MR. R. M. CURRER-BRIGGS, a director of the Whitwood Chemical Co., Ltd., Normanton, is a director of the newly formed Henry Briggs Son & Co. (Trust), Ltd.

It is officially stated that duty collected under the SAFEGUARDING OF INDUSTRIES ACT during October, November, December, and January amounted to £88,138.

A revised and enlarged edition of the list of BRITISH RESEARCH CHEMICALS issued by the Association of British Chemical Manufacturers is now in course of preparation.

The council of Sheffield University have made the following appointments: Mr. Douglas Hay, B.Sc. to the chair of mining; Mr. A. J. Saxton, M.Sc., to the post of assistant lecturer in physics.

Included in the Supplementary Estimate for the Civil Services and Revenue Departments is the sum of £601,200 in connexion with Australian ZINC CONCENTRATES AND SPELTER contracts.

According to an Agencia Americana message from Santiago, the EXPORTS OF NITRATE OF SODA in 1921 hardly exceeded 1,100,000 tons, a much lower figure than that of each of the two preceding years.

Turner Brothers Asbestos Co., Ltd., and the British Everite and Asbestilite Works, Ltd., announce that NEITHER COMPANY HAS ANY CONNEXION with the Orange River Asbestos Mines, Ltd.

The French correspondent of the *Financial News* states that the total potash salt output of the ALSATIAN POTASH MINES during 1921 amounted to 895,744 tons as against 1,203,000 tons in 1920.

MAJOR D. N. GILLMORE has joined the board of Partridge, Naylor & Co., Ltd., of Harrington Street, Liverpool. MR. A. J. MCCULLOCH has been appointed secretary to the firm in the place of Mr. T. M. Roberts retired.

Mr. P. C. Tennant has been re-elected chairman and Messrs. M. A. Ockenden and T. J. Burgess have been elected deputy-chairmen of the PETROLEUM AND ALLIED TRADES SECTION of the London Chamber of Commerce.

The premises of Messrs. Carter & Sons, manufacturing chemists, Attercliffe Road, Sheffield, were, on February 10, completely destroyed by fire. The cause of the outbreak is at present unknown and the damage, which is covered by insurance, is variously estimated at from £10,000 to £50,000.

An examination for a NATURAL SCIENCE SCHOLARSHIP at Keble College, Oxford, will be held on March 14. The subjects are chemistry or biology, with elementary physics, and the annual value is £80, with £20 extra for laboratory fees. Applications should be made to Dr. Hatchett Jackson at Keble College.

Speaking on Monday at the annual meeting of the PAN DE AZUCAR NITRATE CO., LTD., the Hon. H. C. Gibbs said they looked, for the present season, mainly to Europe west of the Rhine and Scandinavia to absorb the stocks of nitrate which had been sold by Chile. The prospects of consumption in these countries were brighter than they were last year.

THE ROYAL COMMISSION on Awards to Inventors will, as from March 1 next, sit in two divisions, the second division sitting on Wednesday during term time at the office of the Commission, Martlett House, Bow Street, London, W.C. 2. A list of the claims which have been allocated for hearing by this division can be inspected at the address mentioned.

As the result of research work carried out by Mr. H. H. Ashdown and others at their Openshaw works, Armstrong, Whitworth & Co., Ltd., have produced A NEW STEEL known as "Vibrac," which is claimed to have the valuable property of never tempering brittle and of being absolutely reliable and consistent in its behaviour under any normal treatment.

The President of the Board of Trade has appointed the following ADDITIONAL MEMBERS OF THE PERMANENT PANEL from which committees are selected from time to time to consider and report upon complaints under Part II. of the Safeguarding of Industries Act: Alderman J. Beard, Mr. A. E. Holmes, Mr. Alexander Johnston, Mr. J. F. Mason, Mr. E. W. Rainer, Mr. James Rowan, and Mr. H. G. Spicer.

The United Alkali Co., Ltd., have given notice to the National Federation of General Workers that, owing to decreased demand for their products and the lower cost of living, the directors have decided to withdraw the 12½ per cent. wage bonus which has been paid to process men and labourers. The reductions will be made by three equal instalments, on March 2, April 6, and May 4.

The Board of Trade has drafted a special Order under the Gas Regulation Act, 1920, relating to CARBON MONOXIDE IN GAS used for domestic purposes. The Order provides that "No gas undertakings as defined by the Act shall supply any gas for domestic purposes containing carbon monoxide unless such gas possesses the distinctive pungent smell of coal gas." The Order requires the approval of both Houses of Parliament.

The value of goods IMPORTED INTO THE UNITED KINGDOM from Germany during December last shows a fall of £50,657 as compared with the previous month. Imports of dyes and dyestuffs were practically the same, there being a difference of only £2 between the figures for the two months. The value of glass and glassware has gone up by £5,236, and an increase of £856 is noted in the value of scientific instruments received.

Messrs. A. B. Searle & Staff, technical advisers on clayworking, inform us that the accommodation at the White Building has for some time past been insufficient for their requirements, and they have, therefore, removed their consulting rooms and offices to 440, Glossop Road, Sheffield. The laboratories and other arrangements for tests remain as before, but all letters should be addressed to A. B. Searle & Staff, 440, Glossop Road, Sheffield.

Among the trade organisations represented at a Conference which met in the offices of the Association of British Chambers of Commerce to discuss CHEAP POSTAL FACILITIES were the Association of British Chemical Manufacturers, the British Chemical Trade Association, the British Engineering Standards Association, the Drug & Fine Chemical Manufacturers' Association, and the National Federation of Associated Paint, Colour, & Varnish Manufacturers.

Papers on "A Theoretical Derivation of the Principle of Induced Alternate Polarities," by A. Lapworth; "An Explanation of the Property of Induced Polarity of Atoms and an Interpretation of the Theory of Partial Valencies on an Electronic Basis," by W. O. Kermack and R. Robinson; "Some Reactions of Benzanthrone," by A. G. Perkin and G. D. Spencer; and "A Rapid Iodimetric Estimation of Copper and Iron in Mixtures of their Salts," by I. W. Wark, were read at a meeting of THE CHEMICAL SOCIETY on Thursday.

H.M. Trade Commissioner at Nairobi has forwarded to the Department of Overseas Trade a copy of the *Tanganyika Territory Gazette*, in which appear the Regulations cited as the MINING (SAFE WORKING) REGULATIONS, 1921, to come into force on January 1, 1922. The regulations are extensive, and deal with machinery, explosives, blasting, protection of surface, underground mining, winding, ventilation, lighting, &c. This copy of the Official Gazette may be inspected on application at the Inquiry Room, Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W. 1.

Among the papers expected to be read at the meeting of the ROYAL SOCIETY on February 23 are: "β-ray Spectra and their Meaning." (Communicated by Sir E. Rutherford, F.R.S.), C. D. Ellis; "A Study of the Balance." (Communicated by Mr. C. V. Boys, F.R.S.), Professor A. E. Conrady; "Suspended Impurity in the Air." (Communicated by Sir Napier Shaw, F.R.S.), J. S. Owens, M.D.; "Magnetism and Atomic Structure. II. The Constitution of the Hydrogen-palladium System and other similar Systems." (Communicated by Professor A. W. Porter, F.R.S.), A. E. Oxley; "Fourier's Series and Analytic Functions," by T. Carleman and Professor G. H. Hardy, F.R.S.

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Abstracts of Complete Specifications

173,799. Siliceous Substances, Drying and Calcination of. H. Spence, I. P. Llewellyn, and Peter Spence & Sons, Ltd., Manchester Alum Works, Holland Street, Manchester. Application date, July 13, 1920.

When shale, fire clay, or the like is treated with sulphuric acid to extract alumina, the siliceous residue after drying and calcination may be used for absorptive and other purposes. When the raw material contains carbonaceous matter difficulties are sometimes experienced in burning out this carbonaceous matter. In the present invention the residue is calcined by its own combustion under atmospheric or forced draught. The material is added gradually in layers to a small fire, and air is forced through in regulated quantities to ensure a slow and complete combustion. If the material contains insufficient carbonaceous matter, it may be mixed with a small proportion of coal. Alternatively, the calcination may be carried out in a kiln. The process is suitable for residues containing up to 30 per cent. of moisture.

173,805. Anthraquinone Derivatives, Halogenation of. F. W. Atack, 57, Dale Street, Manchester, and C. Robertson, School House, Burrelton, Coupar Angus, Scotland. Application date, August 5, 1920.

It is found that when anthraquinone derivatives such as 1-hydroxy-anthraquinone are chlorinated in the presence of a hot aromatic liquid such as nitrobenzene, and a solid alkaline substance to neutralise the hydrochloric acid produced, a high yield of 1-chlor-4-hydroxy-anthraquinone is obtained. To avoid side reactions between the reacting substances, a mild alkaline reagent such as sodium carbonate is used in preference to caustic alkalies. A small proportion of iodine may also be added to act as a carrier. In an example, a mixture of 1-hydroxy-anthraquinone 22.4 parts, nitrobenzene 58 parts, anhydrous sodium carbonate 6 parts, and iodine 0.5 parts, is heated to 120°C. and chlorine passed through until the desired increase in weight is obtained. The product is filtered off, washed with alcohol, dried, and recrystallised from glacial acetic acid. Other examples are given of the chlorination of alizarin bordeaux, 1-benzoyl amino-anthraquinone, alizarin, anthrarufin, and 2-hydroxy-anthraquinone. The sodium carbonate may be replaced by borax or magnesium oxide, and the nitrobenzene by other solvents such as trichlorbenzene. The corresponding bromine derivatives are obtained in a similar manner.

173,812. Electric Furnaces. L. W. Wild and E. P. Barfield, Westminster Testing Laboratory, York Mansions, Westminster. Application date, August 11, 1920.

The object is to avoid the burning out of an electric muffle furnace due to excessive temperature developing within the furnace. For this purpose the heating wire of platinum or nickel-chrome is connected in series with an internal bridge piece of fusible metal, which is adapted to fuse at any predetermined temperature and cut off the current. Metals may be used such as silver fusing at 960°C., copper fusing at 1,080°C., or alloys of these for intermediate temperatures. Alternatively, the fuse may be placed in a shunt circuit so that the current is reduced instead of being cut off. Reference is directed in pursuance of section 7, sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to specifications Nos. 23,889/1905 and 26,929/1906.

173,818. Neutral Sulphate of Ammonia, Manufacture of. J. B. Hansford, Bedford Gas Works, Bedford. Application date, September 4, 1920.

The apparatus is for the continuous production of neutral sulphate of ammonia, in crystalline form in the saturator. Two saturators *a* and *b* are used, and the gases containing ammonia may be delivered to either or both of these by means of the 3-way valve d^1. The gas which passes into the saturator *a* through the distributor d, passes out through the pipe *e* provided with two branches e^2, e^3, separated by a valve e^1. In starting the plant, both saturators contain acid of about 60°Tw., and the gas is passed through the saturator *a* until traces of ammonia are found in the waste gas and the density of the acid has fallen to about 57°Tw. The valve e^1 is then closed so that the gases pass also to the saturator *b* through the distributor e^4, until the liquid in the saturator *a* is neutral. The density of the liquid is then about 52°Tw. The valve d^1 is then set so that the gases are diverted through the

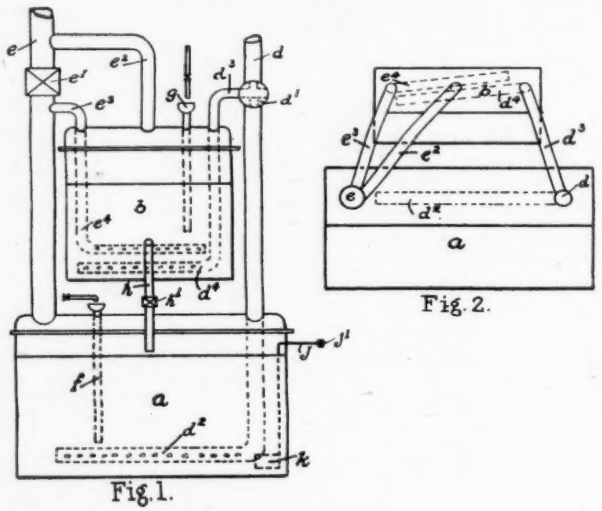


Fig. 1.

Fig. 2.

173,818

distributor d^1 to the saturator *b* and the crystallised sulphate is withdrawn from the saturator *a*. The liquor is then transferred from saturator *b* to saturator *a* through the pipe *h*, both saturators are made up to strength of 60°Tw. by adding sulphuric acid, and the cycle recommences.

173,830. Reagent for Concentration of Ore by Flotation, Method of Making and Process of Using the Same. A. E. Alexander, London. (From Luckenbach Processes, Inc., 57, Post Street, San Francisco, Cal., U.S.A.). Application date, September 13, 1920.

A frothing agent which gives a higher percentage of recovery of mineral substances and which enables other non-metallic minerals such as graphite or sulphur to be floated, is produced from rosin pitch or wood tar pitch. The preferred pitch is obtained by the destructive distillation of the rosin, which is itself obtained by the steam distillation of pine latex. The pitch is dissolved in a solvent such as caustic soda, caustic potash, sodium or potassium carbonate or bicarbonate, ammonia, ammonium salts, or phosphates of sodium or potassium. An oxidising agent may sometimes be added to the frothing agent, such as hydrogen peroxide. Ores which contain iron compounds which it is not desired to recover are treated with the frothing agent to which ammonia has been added to increase the alkalinity, and also a small proportion of potassium permanganate as an oxidising agent. The ammonia content may be varied in treating different ores, *e.g.*, a zinc-iron ore may be treated so that only the zinc values are recovered. To prevent the gangue from floating with the mineral values, a very small proportion of sodium silicate may be added to the frothing agent. This frothing agent is not oily and is miscible with water, so that it may be added to the pulp at any time before or during the floatation operation. It may also be used in conjunction with an oily agent such as a mixture of coal tar and coal tar creosote. Several examples of the preparation of frothing agents are described, and results of the treatment of various American copper ores are given.

173,881. Soluble Condensation Products. J. Y. Johnson, London. (From Badische Anilin & Soda Fabrik, Ludwigshafen-on-Rhine, Germany). Application date, October 11, 1920.

These products are obtained by condensing naphthalene or other hydrocarbons at least bicyclic, or carbazole, or halogen substitution products of such compounds other than their hydroxy derivatives, with a carbohydrate such as cellulose, starch, or their conversion products down to glucose. In an

example, 100 parts of cellulose are dissolved in 1,500 parts of concentrated sulphuric acid, and 192 parts of finely powdered naphthalene then added. The solution is poured into water, neutralised with milk of lime, separated from the calcium sulphate and the dissolved calcium salt decomposed by means of sodium carbonate. The naphthalene may be replaced by other hydrocarbons such as anthracene or phenanthrene. The sodium salt of the condensation product obtained is soluble in water, and precipitates glue from its acidulated solution and basic dyestuffs, when salts such as aluminium sulphate are present.

173,786. Esters and Materials Containing Esters, Process for Producing from Olefines. S. B. Hunt, Mount Kisco, N.Y., U.S.A. Application date, June 30, 1920.

The process is for producting esters and material containing esters, corresponding to lower members of the fatty acid series, from olefines and hydrocarbon material containing unsaturated hydrocarbons of the olefine type such as cracked gasoline, petroleum still gases, &c. The raw material is heated with an excess of an organic acid such as glacial acetic acid containing about 10 per cent. of concentrated sulphuric acid of specific gravity 1.8 for a prolonged period at atmospheric pressure under a reflux condenser. The presence of water should be avoided. Instead of acetic acid, a mixture of calcium acetate and sulphuric acid may be used. The residue, after separation of sulphuric and acetic acids and calcium sulphate, is fractionated and the esters which distil between 115° and 200°C. are collected. The esters are soluble in sulphuric acid of specific gravity 1.57 and may be purified by this means instead of fractionation. The acid solution is diluted to separate the esters. The product either alone or unseparated from gasoline is suitable for purposes such as dissolving pyroxylin.

173,907. Bituminous Materials, Process of, and Apparatus for Distilling. D. Pyzel, 3401, Broadway, Oakland, Cal., U.S.A. Application date, October 19, 1920.

The process is for distilling liquid bituminous materials such as asphaltums, asphaltic residuums, and heavy petroleum oils, and also solid bituminous materials such as oil sand, asphalt sand, rock asphalt, lignite, or oil shale. In distilling liquid or semi-solid bituminous materials difficulties are usually experienced owing to the formation of coke on the retort walls, which obstructs the transfer of heat. In distilling solid bituminous materials it is difficult to produce a uniform temperature owing to the bad conductivity. In the present invention liquid and solid bituminous materials of the kind mentioned above are mixed in such proportions that separate lumps are formed in the retort, which do not adhere to the walls while the retort is rotated. The material is heated internally by hot gases. The mixture is fed from a crushing and mixing apparatus to a conveyor which feeds it into the upper end of a rotary kiln slightly inclined to the horizontal. The necessary consistency may be obtained by adding other solids, such as sand, sawdust, powdered coke or coal, oil sand, &c. The gases liberated pass to a condenser, where oils and ammoniacal liquor are condensed, and the remaining gases pass through a scrubber to eliminate suspended matter and lighter vapour. The heat for distillation is obtained by the combustion of fuel, the hot gas being passed in through a pipe at the lower end of the kiln. Excess of air is avoided to prevent oxidation of the distillation products. Excessive temperature at the inlet is avoided by introducing a spray of water, or by adding some waste gas from the scrubber.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 148,366 (H. Bucherer) relating to phenol aldehyde condensation products, *see* Vol. III., p. 486; 148,785 (C. Falk, M. Wangemann, and C. Falk, jnr.) relating to manufacture of tar, *see* Vol. III., p. 518; 153,007 (Schott and Gen) relating to decomposing boronatrocalcite, *see* Vol. IV., p. 105; 153,605 (R. Marchand relating to preparation of terpineol, *see* Vol. IV. p. 133; 153,877 (Barrett Co.) relating to catalytic agents, *see* Vol. IV., p. 133; 155,814 (C. T. Thorssell and H. L. R. Lunden) relating to production of pure nitrogen, *see* Vol. IV., p. 313; 160,747 (Oldbury Electro-Chemical Co.) relating to manufacture of oxalates and oxalic acid, *see* Vol. IV., p. 626.

International Specifications not yet Accepted

172,923. Purifying Oils and Fats. N. Goslings, 104, Berg en Dalscheweg Nymegen, Holland. International Convention date, December 14, 1920. Addition to 167,462, *see* The Chemical Age, Vol. V., p. 436.

Oils and fats are purified by adding a soluble salt, a base such as lime or zinc oxide, and small quantities of insoluble soaps of fatty acids of high molecular weight, such as lime soaps of cocoanut or palm oil, tallow, or hydrogenated fats or oils.

172,926. Extracting Copper. P. W. Nevill, 102, Goderich Street, and H. Soanes, 160, Adelaide Terrace, Perth, Western Australia. International Convention date, December 13, 1920.

Oxidised copper ores or other products are mixed with water, finely divided iron, and a small proportion of sulphuric acid, or ferrous sulphate with or without common salt. Steam is blown through the mixture and the ore is reduced to metallic copper which may be separated by settling or flotation. Other reducing agents may be used in place of iron, such as aluminium or zinc.

172,937. Purifying Hydrocarbons. Barrett Co., 40, Rector Street, New York. (Assignees of D. F. Gould, Cornwells, Pa., U.S.A.) International Convention date, December 15, 1920.

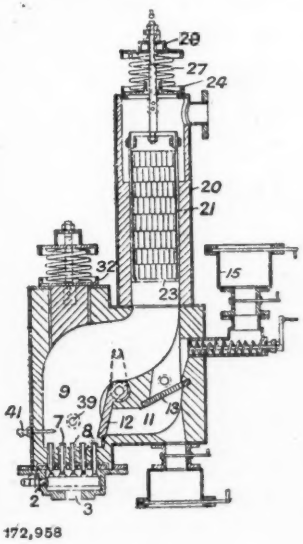
Crude naphthalene is agitated with an equal volume of water or other non-miscible liquid at a temperature slightly above the melting point of naphthalene, viz. 85°C., and the mixture is slowly cooled to 65°C. during eight hours, by adding cold water. Pure naphthalene crystallises out and is centrifuged or filtered. The process is applicable to other crude hydrocarbons such as fluorene, acenaphthene, napthylamine, &c.

172,944. Aluminium Salts. Aktieselskabet Labrador, 7, Solligaten, Christiania. (Assignees of Norske Aktieselskab for Elektro-Kemisk Industri Norsk Industri-Hypotekbank, 24, Toldbodgaten, Christiania.) International Convention date, December 16, 1920.

An impure solution of alumina in mineral acid is freed from iron by partly neutralising it in the presence of catalytic iron oxide. The catalyst, when spent, is regenerated by treating with an acid solution of alumina having a hydrogen ion concentration higher than that necessary to precipitate the iron completely. Such a solution is that from which the iron is to be removed, this removal being effected subsequently by neutralising the solution. These reactions may be combined to form a cyclic process which includes the solution of the raw aluminous material in acid.

172,958. Nitrogen-Carbonic Acid Mixtures. G. Scheib, 18, Markusstrasse and M. Koch, 23, Waldstrasse, Berlin. International Convention date, December 14, 1920.

The process is for the continuous preparation of nitrogen and carbon dioxide from combustion gases. A mixture of gas and air is burned at the burners 8 and the combustion gases pass through the chamber 9 to the column 20, which contains sheet copper spirals which are thus oxidised. Charcoal is fed from the container 15 to the grating 13, so that when the damper 12 is opened, part of the combustion gases pass into the conduit 11 and are reduced by the charcoal yielding a mixture of hydrogen and carbon monoxide. These reducing gases reduce the copper oxide formed in the column 20, so that the process is rendered continuous. The adjustment of the damper 12 may be controlled by a continuously operating gas analyser.



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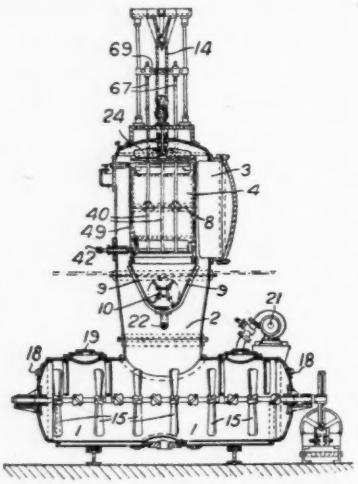
172,962. PURIFYING LIQUIDS. A. J. H. Haddan, London. (Assignee of J. N. A. Sauer, 2, Den Texstraat, Amsterdam.) International Convention date, December 13, 1920. Addition to 163,505.

Liquid and a solid reagent are admitted to a mixing-chamber 1 through openings 18, 19, and the vanes 15 are rotated to move the contents from the centre towards the ends. The mixture then passes upwards through the passage 2 to a series of bag filters 4 in a casing 49, the liquid entering at



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the top. The separated solid matter is detached from the filter cloths by reciprocating scrapers 8 and received in a vessel 9 in which it is rendered homogeneous by a mixer 10. The mixture is then withdrawn by a pump 21 and returned to the chamber 1. The scrapers 8 are reciprocated by a frame 69 operated by an endless chain 14.

172,966. PURIFYING ANTHRACENE. L. Weil and Chemische Fabrik in Billwärder vorm. Hell & Sthamer, Akt.-Ges., 159, Mittelweg, Hamburg. International Convention date, December 17, 1920.

Crude anthracene is mixed with gas oil, vaseline oil or like hydrocarbons having a boiling point of 260°-315°C. and distilled at ordinary or reduced pressure. Anthracene crystallises from the distillate and by a repetition of the process, anthracene of 90 per cent. purity is obtained.

172,979. NITRIC ACID. C. Rossi and C. Toniolo (Officine Elettrochimiche Dr. Rossi), Legnano, Italy. International Convention date, December 20, 1920.

Gases obtained by oxidising ammonia are passed from the furnace through water-cooled coils or other apparatus, and a dilute solution of nitric acid is obtained. This dilute solution is then passed through towers where it meets the remaining uncondensed gases, and the resulting solution is treated with liquid oxides of nitrogen obtained by liquefying part of the ammonia-oxidation gases. The latter are subjected to a preliminary washing with liquid nitrogen peroxide before liquefaction.

LATEST NOTIFICATIONS.

174,569. Apparatus for petroleum refining. Griscom-Russell Co. January 25, 1921.

174,574. Production of low boiling point saturated hydrocarbons from heavy hydrocarbon oils. Chemical Research Syndicate Ltd. January 28, 1921.

174,581. Process for the manufacture of alkali-metal silicates. January 22, 1921.

174,599. Process for the production of granules of cyanamide with a high nitrogen content. January 25, 1921.

174,607. Selenium and the like cells. Mihaly, D. von. December 9, 1920.

174,611. Process of oxidising liquid hydrocarbons. Zerner, Dr. E. January 29, 1921.

174,913. Manufacture of saccharine. Lowe, H. January 31, 1921.

174,915. Processes of vulcanising rubber and products obtained thereby. Nangatuck Chemical Co. February 1, 1921.

174,925. Methods of introducing anodes for metal vapour rectifiers. Weiss, H. February 1, 1921.

174,955. Processes and apparatus for evaporating, vaporising and distilling. Akt.-Ges. Brown, Boveri, et Cie. February 5, 1921.

Specifications Accepted, with Date of Application

153,254. Synthesis of ammonia, Catalytic materials adapted for use in. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. October 28, 1919.

157,849. Distillation, Process of—and apparatus therefor. Chemische Fabriken Worms Akt.-Ges. August 6, 1917.

174,383. Tanning, Process of. H. C. Harris and W. Walker & Sons, Ltd. December 29, 1920.

174,389. Hydrocarbons, Process for treating. A. J. Stephens. (*Canadian-American Finance and Trading Co., Ltd.*) August 12, 1920.

174,418. Oxygen gas, Generation of. L. A. Levy and R. H. Davis. October 20, 1920.

174,498. Gas-Producers and the like. N. E. Rambush. November 26, 1920.

174,554. Hydroquinone, Process for the manufacture of. W. Carpmael. (*Chemische Fabrik auf Actien vorm. E. Schering.*) September 19, 1921.

174,555. Furnaces for the production of mineral distillates of definite composition. H. Mayers and Britons, Ltd. October 7, 1918.

Applications for Patents

Akt.-Ges. Brown, Boveri, et Cie. Evaporating, vaporising, and distilling. 3,463. February 6. (Switzerland, February 5, 1921.)

Ashcroft, E. A. Precipitation of precious metals from cyanide solutions containing them. January 31. 2,857.

Atack, F. W. Compositions containing soap or oily matter and colouring-matter. 2,678. January 30.

Atack, F. W. Process for sulphurising organic compounds. 2,827. January 31.

Bullinger, T., Teichner, and Winternitz, G. H. Process of oxidising hydrocarbons. 2,739. 2,740. January 30. (Austria, January 29, 1921.)

Burgess, Ledward, & Co., Ltd. and Harrison, W. Dyeing cellulose acetate. 3,304. February 4.

Denny Chemical Engineering Co., Ltd., and Knibbs, N. V. S. Hydration of Lime, &c. 2,747. January 30.

Farbenfabriken vorm. F. Bayer & Co. Manufacture of azo dye-stuffs. 2,880. January 31.

Federal Phosphorus Co., and Fairweather, H. C. G. Production of phosphoric acid. 3,022. February 1.

Lefranc et Cie. Process for manufacture of butyric acid with recovery of gases of fermentation. 3,136. February 2. (France, September 26, 1921.)

Hovey, D. W. Obtaining hydrocarbon distillates. 3,447. February 6.

Maclaren, A. F. Treatment of sulphide ores. 3,626. February 7.

Moseley, J. F. Production of colloidal dispersions. 3,647. February 8.

Peachey Process Co., Ltd. and Shaw, A. H. Impregnation of liquids and solutions with soluble gases. 3,405. 3,411. February 6.

Safe Superheat, Ltd. and Maclaren, A. F. Treatment of sulphide ores. 3,626. February 7.

Sallmann, R. Manufacture of chromium compounds of azo dye-stuffs. 3,745. February 8.

Sharples, P. T. Method of refining petroleum. 3,787. 3,788. February 9.

Soc. of Chemical Industry in Basle and Straub, F. Manufacture of chromium compounds of azo dye-stuffs. 3,745. February 8.

Citric Acid Contract Arbitration

SITTING as a King's Bench Divisional Court on February 9, Justices Swift and Acton heard a motion by Messrs. Scott & Holder, Ltd., Cannon Street, London, to set aside an award in a matter of arbitration with Messrs. S. Van Minden & Co., Leadenhall Street, London, respecting contracts for citric acid crystals. Messrs. Scott & Holder had agreed to sell Messrs. Minden & Co. 20 tons of the crystals, to be delivered in 5-ton lots. The total purchase price was stated to be £5,217 10s. 4d. Scott & Holder, Ltd., subsequently claimed damages for alleged non-acceptance by the buyers, and the arbitrators found in the latters' favour. Messrs. Scott & Holder sought to set aside the award on the ground that it was not a final award, that it was not certain, and that it did not deal with the whole of the matters between the parties.

Mr. Justice Swift, giving judgment, said he had come to the conclusion it was impossible to understand the award or to treat it as a final award. It was not certain and did not finally dispose of the rights of the parties in dispute. Therefore the award would be set aside. Mr. Justice Acton concurred.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, FEBRUARY 15, 1922.

BUSINESS continues to show a tendency to expand, and in some directions home trade has been distinctly better. Prices continue steady, with very few changes in values.

Stocks of some products now appear to be very light, and prices for these tend upwards. There has been some small export inquiry, but no considerable business has been concluded.

General Chemicals

ACETONE is firm on the spot and in fair demand.

ACID ACETIC continues very firm, with supplies on the light side.

ACID FORMIC has been in demand, and price very firm.

ACID LACTIC continues quietly steady, with a small demand.

ACID TARTARIC has been moderately active, but orders are for relatively small quantities.

BLEACHING POWDER has been in better request, especially on export account.

CALCIUM CARBIDE continues quietly steady, with price, if anything, slightly in buyers' favour.

COPPER SULPHATE.—Only a small inquiry, with little business to report.

FORMALDEHYDE is firm on the spot, but only a moderate business is passing.

LEAD ACETATE continues quietly steady, but is only called for in small quantities.

LEAD NITRATE is inactive.

LITHOPONE has been in better demand at last-quoted figures.

POTASSIUM CAUSTIC has been fairly steady, with a moderate demand.

POTASSIUM CARBONATE has been in better request, and the price is now firmer.

POTASSIUM CHLORIDE is inactive.

POTASSIUM PRUSSIATE is scarcer, and the price is inclined to harden.

SODIUM ACETATE has been quite a bright spot, and fair orders have been placed.

SODIUM BICHROMATE remains inactive, with sellers at below makers' prices.

SODIUM CHLORATE is idle.

SODIUM NITRITE is only in small request at recent quotations.

SODIUM PRUSSIATE is a shade weaker, but is still scarce and in fair demand.

ZINC OXIDE is quietly steady, but only a poor business is reported.

Coal Tar Intermediates

The volume of business passing continues small, but signs are not wanting of a rather better demand to come. The export market continues on the quiet side, but a few inquiries have been received.

ALPHA NAPHTHOL.—A fair business is passing on home account, and the price is firm.

ALPHA NAPHTHYLAMINE.—One or two good orders have been received, and the price is unchanged.

ANILINE OIL AND SALT are steady, and a fair business has been done in the former material, both on home and on export account.

BENZIDINE BASE is firm at last-quoted price.

BETA NAPHTHOL is quiet, but the price is firm and re-sale parcels are not in evidence.

DIMETHYLANILINE is steady, and a good business has passed.

DIPHENYLAMINE is without change.

"H" ACID.—The firmness indicated in our last report is maintained, and a fair business has passed.

NITROBENZOL.—The usual steady consumption is going on.

PARANITRANILINE.—A few orders have been booked on home account.

PARAPHENYLENEDIAMINE is firm, with regular business passing.

"R" SALT is quiet and the price unchanged.

Coal Tar Products

There is little change in the market for tar products since last week.

90's BENZOL is still fairly plentiful, and is selling at 2s. 5d. to 2s. 6d. on rails.

PURE BENZOL has a poor inquiry, and is worth about 2s. 10d. on rails in the Midlands, and 3s. 2d. to 3s. 3d. in London.

CREOSOTE OIL is weak and is worth 4¾d. on rails in the North and 6d. to 6¼d. in the South.

CRESYLIC ACID is still fairly plentiful, and is quoted at 2s. to 2s. 1d. on rails for the Pale quality, and at 1s. 9d. to 1s. 10d. for the Dark 95/97%.

SOLVENT NAPHTHA has been rather more active, and is worth 2s. 4d. on rails in the Midlands.

NAPHTHALENE is uninteresting, crude qualities being worth from £5 to £8 per ton, and refined from £15 to £17 per ton.

PITCH.—The market remains firm, with good demand, and prices are still advancing. To-day's quotations are 70s. to 72s. 6d. f.o.b. London, 67s. 6d. to 70s. f.o.b. East Coast, and 65s. to 67s. 6d. f.o.b. West Coast.

Sulphate of Ammonia

There is a good demand for home trade, and there appears to be a shortage of prompt material.

The export demand remains satisfactory although very few transactions have been concluded during the last few weeks, as it appears necessary to reserve the whole of the output at present for the home demand.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	80	0	0	to	82	10	0
Acid, Acetic, glacial, 99-100%	ton	55	0	0	to	60	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic	ton	90	0	0	to	95	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	0	to	0	2	1
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	9	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol	ton	40	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	45	0	0
Nitric, 80 Tw	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	43	0	0	to	45	0	0
Pyrogallic, cryst	lb.	0	7	0	to	0	7	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	4	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Acid, Tannic, commercial	lb.	0	2	9	to	0	3	0
Tartaric	lb	0	1	3	to	0	1	4
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	30	10	0	to	32	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	13	10	0	to	14	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	10
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to	—		
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	—		
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0

	Per	£	s.	d.		£	s.	d.
Barium, carbonate, 92-94%	ton	12	10	0	to	18	0	0
Barium, Chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	14	10	0	to	15	10	0
Nitrate	ton	40	0	0	to	42	0	0
Barium Sulphate. blanc fixe, dry	ton	24	0	0	to	25	0	0
Sulphate, blanc fixe, pulp	ton	15	0	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to	—		
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, ,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	7	10	0	to	8	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	0
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	120	0	0	to	125	0	6
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	82	0	0	to	83	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	4	5	0	to	4	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	45	0	0	to	47	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	27	0	0
Magnesium chloride	ton	10	10	0	to	11	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	14	10	0	to	15	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	61	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	34	0	0	to	35	0	0
Potassium bichromate	lb.	0	0	7¾	to	—		
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Meta bisulphite, 50-52%	ton	112	0	0	to	120	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2	to	0	1	2½
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to	—		
Seconds	cwt.	3	0	0	to	—		
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5¾	to	—		
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	3¾	to	0	0	4
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	20	10	0	to	21	0	0
Sodium Perborate	lb.	0	1	2	to	0	1	3
Prussiate	lb.	0	0	9½	to	0	0	10
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	0	0
Sulphite, cryst	ton	13	0	0	to	14	0	0
Strontium carbonate	ton	60	0	0	to	65	0	0
Strontium Nitrate	ton	60	0	0	to	62	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6½	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	38	0	0	to	40	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	2	9	to	0	3	0
Alphanaphthylamine	lb.	0	2	0	to	0	2	3
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	lb.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	10	to	0	2	0
Benzoate of soda	lb.	0	1	9	to	0	1	11
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	9	to	0	2	0
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	10	to	0	1	0
Dinitronaphthaline	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	6	4	3 to	0	4	
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	11	0	to	0	11	6
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	3	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Potash

THE volume of trade in potash fertilisers has increased considerably with the approach of the spring planting season. As the question of prompt delivery will no doubt become more difficult during the active season when large quantities of fertilisers will have to be delivered on short notice, buyers are strongly advised to estimate their requirements and order as soon as possible so that delivery may be assured in time for the planting of the spring crops. It seems scarcely possible that any of the potash fertilisers will be offered at lower prices, for the present quotations have been made possible only through adverse rates of exchange and somewhat unstable competitive conditions. The current prices now quoted are as follows:

	£	s.	d.				
Kainit 14 per cent.	2	12	6	f.o.r.	in	bags	London.
Sylvinite 20 per cent.	3	12	6	,,	,,	,,	,,
Sylvinite 30 per cent.	5	12	6	,,	,,	,,	,,
Muriate of potash 50 per cent.	10	10	0	,,	,,	,,	,,
Sulphate of Potash 90 per cent. purity	14	10	0	,,	,,	,,	,,

During the last week shipments have been somewhat delayed owing to the freezing of the great waterways on the Continent.

Inquiries for all classes of potash fertilisers continue good, there being a specially good demand for kainit from all parts of the country. There is also a particularly good inquiry for sulphate of potash, both for mixing purposes by manure manufacturers and for direct application to the potato and other spring crops.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, FEBRUARY 15, 1922.

THE improvement in the Chemical Trade, although slow, is being maintained.

There have been more inquiries for export, and sales for the home market are better.

Alkali products are in steady request, but the needs of the textile trade are still very limited.

Potashes (carbonate and caustic) are in greater request, although prices are slightly easier. Some cheap prices from the Continent are recorded.

Continental chemicals are not arriving in any great quantity, consequent on the congestion of railways and labour troubles.

Coal tar products, through the improvement in the iron industry, are more plentiful, and prices incline to be easier, especially for benzol and naphthalene.

Industrial Chemicals.

ACETONE.—Supplies are better, owing to principal consumers having covered their requirements.

ACID, ACETIC (GLACIAL).—Slightly dearer, at £55 to £60 per ton. A few inquiries for lower strengths: 40 per cent. technical quoted £26; 40 per cent. B.P. 20s. per ton extra; 80 per cent. technical quoted £46 10s.; 80 per cent., B.P. 40s. per ton extra.

ACID BORACIC.—No change in price. Crystal £65. Powder £67, bags included.

ACID CARBOLIC, 39/40°.—6d. per lb. but little business passing.

ACID, MURIATIC, 28/32 PER CENT.—Little demand. Price unchanged, at about 7s. per carboy, ex works.

ACID, NITRIC, 80°.—£25 10s. per ton. Only a moderate local consumpt.

ALUMINA SULPHATE.—Few inquiries. Continental sellers quoting 17/18 per cent. at £11, and 14/15 per cent. at £9 c.i.f. U.K. ports.

ALUM, POTASH.—Price unchanged, at £15 10s. per ton. Very few inquiries.

AMMONIA, CARBONATE.—4d. to 4½d. per lb. Little business passing.

AMMONIA, LIQUID, .880.—4d. per lb. Small local request.

AMMONIA, MURIATE (Galvanisers).—Remains unchanged, at £34 10s. per ton, f.o.r.

AMMONIA, MURIATE (Salammoniac).—In moderate request. "First," £65 per ton. "Second," £60 per ton.

AMMONIA, NITRATE.—£24 per ton, f.o.b. for 33 per cent. Supplies scarce. Continent offering at less money.

AMMONIA, SULPHATE.—In fair request, for early delivery. 25¼ per cent., £15 10s. per ton. Neutral 25¾ per cent., £16 13s. per ton.

ARSENIC, CORNISH WHITE.—Few inquiries, price nominal at £40 per ton, ex works.

BARIUM CHLORIDE, 98 PER CENT.—No demand. Quoted £14 15s. ex station.

BARYTES.—Home product firm at £6 per ton ex station, for fine white quality. Continental slightly dearer.

BENZOL.—Market weaker and producers asking for 90's, 2s. 5d. per gallon, delivered.

BLEACHING POWDER.—No change in price and little demand. £15 to £16 per ton, delivered, for spot lots.

CALCIUM CARBIDE.—Few inquiries. Price remains at £20 per ton. Continental offers at £13 per ton, f.o.b. Hamburg.

CALCIUM CHLORIDE.—Price remains at £7 10s. ex quay. Cheaper Continental offers.

COPPERAS, GREEN.—Practically no inquiry. Price about £5 10s. ex store.

COPPER SULPHATE.—Inclined to be easier. £27 per ton ex station.

FORMALDEHYDE.—Few inquiries. 40 per cent. quoted around £80 ex wharf.

GLAUBER SALTS.—Price unchanged, at £5 per ton ex store.

LEAD ACETATE (White).—No inquiry. Price £43 per ton ex works.

LEAD, RED.—Market easier, at £36 per ton ex station.

LEAD, WHITE.—Very little demand. Price quoted, £50 per ton ex station.

MAGNESITE, GROUND CALCINED.—Some little business done at £13 10s. per ton ex store.

MAGNESIUM CHLORIDE.—Continental quotations slightly cheaper. £8 10s. per ton ex store.

MAGNESIUM SULPHATE (Epsom Salts).—Druggists £10 10s. per ton. Commercial, £9 5s. per ton. Small demand for local consumpt.

NAPHTHALENE, FLAKE.—Market weaker on account of offers from the Continent at £11 10s. f.o.b. Hamburg.

NITRE CAKE.—Considerable demand at around 20s. per ton f.o.r. works.

POTASSIUM BICHROMATE.—7½d. to 8d. per lb., but not much inquired for.

POTASSIUM CARBONATE, 90/92 PER CENT.—Very little demand. Quoted at £28 to £29 per ton. Cheap quotations for 96/98 per cent., at £29 15s. c.i.f. U.K. port, ex Continent.

POTASSIUM CAUSTIC, 89/92 PER CENT.—Continental works now quoting slightly cheaper, at £30 15s. per ton, c.i.f., but delivery likely to be delayed. Spot lots quoted at £34 per ton, ex station. Better inquiry, but not much actual business.

POTASSIUM NITRATE.—Market inclined to be firmer, but spot lots still available at £35 per ton ex store.

SODIUM ACETATE.—A little business done around £23 10s. per ton.

SODIUM BICARBONATE.—Refined, £11 10s. per ton; mineral water quality, £10 10s. per ton, in bags, ex station.

SODIUM CARBONATE (Refined Alkali), 58 per cent.—£9 15s. ex quay, for spot lots.

SODIUM CARBONATE (Soda Crystals).—Price remains unchanged at £6 10s. ex station.

SODIUM CAUSTIC.—70/72 per cent., £23 10s. per ton ex station; 76/77 per cent., £25 10s. per ton ex station; 98 per cent. powdered and flaked, £29 to £30 ex station; 60 per cent., broken, £26 per ton ex station. Small steady demand.

SODIUM NITRATE.—The stocks show little sign of material diminution, and reductions in price are still looked for.

SODIUM SILICATE, 140°Tw.—£12 10s. to £13 per ton ex station, according to quantity.

SODIUM SULPHATE (SALTCAKE, 95 PER CENT.).—A few inquiries for export. Price unchanged, at £4 per ton f.o.b.

SODIUM SULPHIDE, CRYSTALS, 30/32 PER CENT.—£13 per ton f.o.r. works.

SODIUM SULPHIDE, CONCENTRATED, 60/62 PER CENT.—Recent quotations at £20 per ton f.o.b. Home trade, £22 per ton ex station.

SODIUM SULPHITE.—£14 to £15 per ton. Price nominal. No inquiry.

SODIUM HYPO-SULPHITE.—Commercial, in casks, £14 per ton. Pea crystals, casks, £17 per ton; kegs, £19 per ton.

SULPHUR, BEST REFINED SICILIAN ROLLS.—Offered at £9 10s. c.i.f. Liverpool and Manchester.

SULPHUR, SICILIAN THIRDS.—Some Government surplus stocks still available at £4 5s. to £4 15s., according to quantity.

ZINC CHLORIDE.—Continental makers quoting £21 10s. c.i.f. U.K. port.

ZINC DUST, 93 PER CENT.—£42 per ton c.i.f. U.K. port.

ZINC SULPHATE.—Little inquiry at £14 per ton.

WAXES.—CANDILILLA: Supplies difficult to obtain. Price, £127 10s. per ton c.i.f. U.K. port.—REFINED PARAFFIN, 140°: Still to be had from Government surplus stock at moderate price.—SEMI-REFINED PARAFFIN, 118/120°: 2¼d. per lb. delivered.—WHITE PARAFFIN SCALE: £14 to £15 per ton c.i.f. for forward shipment.

NOTE.—Prices stated are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—A few inquiries. Price 2s. 1d. per lb., carriage paid.

ANTHRANILIC ACID, 96 PER CENT.—Few small inquiries, 15s. per lb. 100 per cent. basis, carriage paid.

DINITROBENZOL.—Some inquiries for home trade. Price 1s. 7d. per lb. delivered.

DINITROCHLORBENZOL.—Some inquiry for export. Price £90 per ton f.o.b.

"H" Acid.—Very few inquiries. Price 7s. per lb. f.o.b.

Para Cresol.—Some inquiry for home trade. Price quoted, 2s. 6d. per lb. f.o.r. works.

Paranitraniline.—Small inquiry. Price quoted, 3s. 9d. per lb. delivered, or f.o.b.

"R" Salt.—Price remains steady at 3s. 4½d. per lb. carriage paid.

Tobias Acid.—Some inquiry for home trade; 6s. per lb. 100 per cent. basis, carriage paid.

German Chemical Trade Notes

From Our Own Correspondent

Berlin, February 12, 1922.

The main feature during the past week has been the railway strike, which has resulted in an unsettled feeling on the whole market, and losses on this account have been considerable. Trade is further handicapped by increased freight rates and postal charges. No business of any size has been possible, and quotations have varied widely. The following domestic quotations are given in marks per kilogram:

Acid, Boric, pure, 55 mk. Acid, Nitric, 36° Bé, 5.75 mk.; 40° Bé, 7.55 mk. Acid, Oxalic, 98/100%, crystallised, 30 mk. Acid Phosphoric, chemically pure (1,750), 48.25 mk.; (1,120) 11.75 mk. Alum, Crystal Powder, fine, 5.75/6.75 mk.; coarse, 5.60 mk. Alum, Chrome, 19/20 mk. Ammonia Carbonate, powdered, 14.50 mk. Barium Chloride, 9.50 mk. Borax, powdered, 31 mk.; crystallised, 30 mk. Calcium Chloride, 70/75%, 3.50 mk. Copperas, crystallised, commercial quality, loose, 2.30 mk. Copper Sulphate, 98/99%, 18/21 mk. Epsom Salt, 3.20 mk. Glucose, White, A1 quality, 14.95 mk. Magnesium Chloride, fused, in drums, 5.25 mk.; in barrels, 4.35 mk. Potash Carbonate, 80/84%, 16 mk.; 90/95%, 18 mk.; 96/98% 21 mk. Potash Caustic, 88/92%, 24.50 mk. Caustic Potash, liquor, 50° Bé, 11 mk. Potassium Chlorate, 22 mk.; Potassium Nitrate, powdered, double rectified, 14 mk. Salt Cake, 2 mk. Soda Ash, 7.25 mk.; crystallised, 2.10 mk. Soda Caustic, 125/128° Bé, 25 mk. Soda Caustic liquor, 38/40° Bé, 7.50 mk. Soda Cyanide, 112 mk. Soda Silicate, 36/40%, filtered, 2 mk. Soda Sulphide, 30/32%, 9.50 mk.; 60/62%, 17 mk. Tetraline, 12.90 mk. Paint Materials.—Red Lead, 28/29 mk.; White Lead, in oil, 29 mk.; powdered, 30 mk. Lead Acetate, crystallised, 27 mk. Litharge, 30 mk. Lithopone, white, red-seal, 10.75/12 mk.; yellow seal, 7.75 mk. Zinc, White, green seal, 27/33 mk.; red seal, 27.50 mk.

The market for Coal-tar products remains much the same as during last month. The railway strike has had its effect on local markets, and firm quotations have been negligible. The Silesian and Rhenish-Westphalian markets are in a very different position, as will be seen from the following quotations on the Silesian market on February 11:

Crude Tar, 3 mk. per kilo. Prepared Tar and Pitch, 2.50/2.60 mk. per kilo. Carbolineum, 4 mk. per kilo. Anthracene Oil, 3.10/3.20 mk. Benzol, in tanks, 10 mk.; in barrels, 11.20 mk. Coal Tar, warranted anhydrous, distilled, 2.90 mk. Coal Tar, hard pitch, in lumps, 2.75/2.80 mk. Naphthalene, pure, 10 mk.; in flakes, 9 mk.; in balls, 9.50 mk.

The Nitrate Position

Distinct Signs of Returning Confidence

In their monthly report on nitrate of soda, Henry Bath & Son, Ltd., state that at the turn of the year the currency prices asked by the pool in the various retail markets of Europe had reached too high a level to be compatible with a continuation of sales. The greater part of the advance since October had been dictated by the pronounced weakening of the French and Belgian franc, and when the tide turned and the franc had regained about 10 per cent. in value, pool prices were left high and dry at the parities of about £15 to £15 10s. for January to April delivery. The market was thus at the disposal of outside shipments from Chile, the latter being very materially aided in addition by a fall since October of some 15s. per ton in freights and so it became a question for the pool whether to remain aloof until the coast could ship no more in time for spring requirements, or to drop prices and inevitably to create a loss of confidence reacting on demand. The latter alternative was chosen early in January; prices were reduced about £1 per ton; and the pool appeared once again in its well-known role of scapegoat for everything that had miscarried—freight, exchange, and a pardonable desire to continue realising its stock, even to the detriment of a policy originally designed to support its early buyers.

This state of affairs made January an unhappy month for the nitrate market and, apart from a few transactions in liner parcels for season arrival at about £13 c.i.f., business was confined to resales and outside selling in consuming markets at the parity of about £13 per ton delivered. Latterly, however, the temperature has been veering a little more towards normal and, failing the further fall in prices which the pool's critics had judged to be the obvious corollary to the first one, there are now distinct signs of returning confidence and a revival of inquiry. January deliveries from ports were about 67,000 tons, compared with 33,000 tons last year, and there is every indication that consumption during the present month will also make a good showing. The uneasiness resulting from the lowering of pool prices seems to have led to very considerable realising by secondhand and outside holders, and suggests that the greater part at least of the next demand will accrue to the benefit of the pool, whose sales in the near future should therefore improve materially. Nitrate f.o.b. Chile has been neglected, the only transactions reported being ordinary nitrate for January shipment at 10s. 2½d. and refined for February shipment at 10s. 8½d. per quintal.

January production at 68,640 tons shows a falling off compared with December of about 6,000 tons. During last month only 31 oficinas were working, against 35 in December, though on the other hand last month's output of 8,000 tons by non-associated producers is the highest for many months past. Freights continue inactive with space by liners for early loading quoted at 25s. to 27s. 6d. and steamers at about 30s. per ton for the usual range.

Creosote for U.S.A.

A communication has been received in the Department of Overseas Trade from H.M. Consul General at Portland, Oregon, relative to the desire of a local company to be placed in touch with producers and exporters of creosote, with a view to opening up an extensive trade between this country and the Oregon coast. The Consul states that in past years full cargoes of creosote have occasionally reached that coast from Scotland by tanker direct, and the product has generally been divided between the three principal creosoting plants on the Columbia River, Puget Sound, and British Columbia, where it is mainly employed in treating lumber for preservative purposes. There are, however, other uses to which the product can be put, and the company believe that a satisfactory trade opening can be established if the right price can be found. They would, therefore, be glad to be placed in touch with the principal dealers in this commodity, in order to be able to secure prices f.o.b. British port. The name and address of the company referred to may be obtained by manufacturers and exporters on application to the Department of Overseas Trade, 35, Old Queen Street, London. The reference No. 14006/FW/Sc (2) should be mentioned.

Action for Damages Against Davis Brothers

The Basford Chemical Co., Ltd., Vernon Road, Old Basford, were the plaintiffs in an action at the Nottingham County Court on Monday against Davis Brothers, 66, Deansgate, Manchester, chemical engineers and consulting chemists.

The plaintiffs claimed damages for injury by the defendants' alleged negligence as skilled advisers and contractors to the company. Davis Brothers undertook the installation of a small regulating fan and a small steam engine to remedy a defect in the manufacturing process carried on at the Basford works. The fan was intended to increase and maintain uniformity of suction in a draught, which induces the flow of certain gases, and on the ground that it was unsatisfactory the plaintiffs rejected it, installing another, which the defendant firm had recommended should not be used, but which, nevertheless, proved entirely satisfactory. Davis Brothers counterclaimed £76 11s. for goods supplied and services rendered as consulting chemical engineers.

Mr. Moss said that the plaintiffs, who were manufacturers of sulphuric acid, could get no effective work out of the fan after its installation, adding that so far from proving of assistance it made matters worse.

The defendants contended that the absence of a proper rigid foundation caused excessive vibration, thus rendering the fan incapable of effective work. They were only asked to supply the engine and fan, but not to erect the staging.

Judgment was deferred.

Company News

ENGLISH CHINA CLAYS.—The directors have decided to defer the payment of a dividend on the preference shares.

NATIONAL MATCH FACTORY OF VENEZUELA.—After providing £1,749 for income tax, the profit and loss account for the year to August 31 last shows a debit balance of £6,877.

BRITISH BURMA PETROLEUM CO., LTD.—On behalf of the trustees of the six per cent. first debenture stock, the company are asking for tenders of this security for sinking fund purposes.

HARRISON, BARBER & CO., LTD.—The directors announce a dividend of 2½ per cent. for 1921, payable on February 23. The sum of £1,298 is carried forward to the current year's accounts.

WELSBACH LIGHT CO. OF AUSTRALIA, LTD.—The annual meeting will be held at 83, Farringdon Road, London, on February 27, at 10.30 a.m. The transfer books are closed from February 16 to 28 inclusive.

NEW TAMARUGAL NITRATE CO.—The directors announce a final dividend of 10 per cent., less tax, payable on March 1, making 15 per cent. for the year ended July 31 last. For the previous year the dividend was 20 per cent.

PAN DE AZUCAR NITRATE CO., LTD.—Speaking at the annual meeting on Monday, the chairman said the gross profit for the year to June 30 last was £48,367 on 231,000 quintals. In the preceding year the gross profit was £23,439 on 374,000 quintals. The average prices secured were respectively 16s. 0½d. and 10s. 4d. per quintal f.a.s.

DUNLOP RUBBER CO., LTD.—At the twenty-third ordinary general meeting held in London on February 10, Mr. F. A. Szarvasy proposed that an entirely independent investigation into the affairs of the company should be held over a number of years past. He suggested that an eminent accountant should be appointed and a shareholders' committee formed to act with him. These proposals were adopted by the shareholders.

YORKSHIRE DYEWARE AND CHEMICAL CO., LTD.—Dealings in 133,333 shares of 15s. each, fully paid, Nos. 1 to 33,333, and 100,001 to 200,000, have been specially allowed by the Stock Exchange Committee under Rule 148a. These securities will rank *pari passu* with those in which special settling days have already been appointed as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted.

SHELL TRANSPORT AND TRADING CO., LTD.—The company have been inviting subscriptions at par for 5,000,000 (part of 10,000,000 authorised) 7 per cent., second preference shares of £1 each. The present share capital of the company is £43,000,000, divided into 300,000 5 per cent. first preference shares of £10 each, of which 200,000 are issued; 10,000,000 7 per cent. second preference shares of £1 each, of which the present issue is 5,000,000; and 30,000,000 ordinary shares of £1 each, of which 19,365,144 are issued. The subscription list opened on Monday and was closed the same day.

HORACE CORY & CO.—The profit for the past year, after reserving £450 for Corporation Profits Tax, is £7,874, to which has been added £2,458 brought forward, making together £10,332. An interim dividend on the preference shares, amounting to £1,375, was paid to June 30 last, and on January 1 a preference dividend for the six months to December 31 last, amounting to £1,375, was also paid. The directors now recommend a dividend on the ordinary shares of £6 per cent. for the year, which will absorb £6,000, and carry forward £1,582. The annual meeting will be held at the First Avenue Hotel, London, on February 23, at noon.

The Value of Mixed Fertilisers

MR. G. A. COWIE, well known as an authority on potash and as an advocate of its use in conjunction with other artificial and natural manures, has issued an attractive folder showing the good effect on potatoes of a properly-balanced fertiliser mixture—sulphate of ammonia, superphosphate, and sulphate of potash or potash-magnesia—with or without a moderate natural manure dressing. The results are given of various experiments, and these all show a substantial increase of yield where potash was used. Any readers of THE CHEMICAL AGE interested in the subject may obtain a copy of the publication free on applying to the author at 39, Victoria Street, Westminster, S.W. 1.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
British India.	Metals (ingots of antimony, copper, tin and zinc).	D. O. T. 3667/ T.G.
Toronto	Chemicals, colours and oils.	—
Canada	Vulcanising machines	—
Denmark	Blasting machinery	D. O. T. 4890/ F. R./ S. C. 2.
Cartagena ..	Chemical manures	183
Madrid	Engines and crushers	186
Oregon, U.S.A.	Creosote	D. O. T. 14006/ F. W. S. C.2
Nantes	Sulphate of copper, sulphur and wax	177
Madrid	Pharmaceutical and heavy chemicals; crude drugs; dextrine, gums, balsams and waxes; vegetable oils; petroleum jelly, &c.; glycerine; chemical manures; copper sulphate	185
Stockholm ..	Chemical products and druggists' supplies	188
Hong-Kong ..	Druggists' sundries, paints and oils	194
Mexico	Drugs	202
Rio de Janeiro	Heavy and industrial chemicals, including aniline dyes	199

Tariff Changes

JAMAICA.—Revised forms of certificates of origin and value, and invoices to be used in connexion with the importation of goods under the British Preferential Tariff have been approved. These forms are identical with those recommended for adoption by the Imperial Customs Conference, 1921, and contained in Cmd. 1,231, which is obtainable from H.M. Stationery Office, price 2d.

NEW ZEALAND.—A supplement to the Board of Trade *Journal* of February 9 comprises a revised Customs Tariff in which a number of changes are made in regard to chemicals and drugs, dyes, &c.

ITALY.—The price fixed for the first half of February for certificates for payment of Customs duties is 442 lire for 100 lire gold—*i.e.*, the surcharge when duties are paid in paper is 342 per cent.

MOROCCO (FRENCH ZONE).—Regulations regarding the manufacture, sale, packing and labelling of butter, margarine and edible oils and fats may be inspected at the Tariff Section of the Department of Overseas Trade, 35, Old Queen Street, London.

The Case for a Rubber Parliament

AT a meeting of the Institution of Rubber Industry, held on Tuesday at the rooms of the Royal Society of Arts, London, Mr. Brooking (the President) presiding, Mr. D. F. L. Zorn, Chairman of the Rubber Shareholders' Association, read a paper on "The Case for a Rubber Parliament." Representing Parliament as a consultative body, a means of ventilating grievances, and a means of throwing light upon obscure proceedings, Mr. Zorn said these were the aspects of Parliament which were of importance with regard to the rubber industry. The Council which he proposed would exist for the interchange of ideas and for the non-legislative functions of a Parliament. It was quite possible that in the course of time and by mutual consent measures for the benefit of the whole industry might be devised. A Central Council of the type suggested would ultimately comprise representatives of every branch of the industry.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

COHEN, Harris, and GRIZZARD, Samuel, manufacturers, factors, importers, exporters and general merchants of soda and other alkaline products, at 179 and 180, Saint George's Street, E., under the style of THE GRIZCO MANUFACTURING CO., by mutual consent as from February 3, 1922.

Company Winding Up

RUSSELL OIL AND CHEMICAL CO., LTD. meeting at Balfour House, 119, Finsbury Pavement, London, E.C. 2, on Thursday, February 23, of debenture holders (2.30 p.m.) and unsecured creditors (other than preferential creditors) for £20 and upwards (3 p.m.), to consider proposed scheme of arrangement. Cochrane & Cripwell, 55, Temple Row, Birmingham, solicitors for the company.

Company Winding Up Voluntarily

DUBOIS & CO. (HAGGERSTON), LTD. A. P. Mitchell, 29, Aberdeen Road, Wealdstone, Harrow, appointed liquidator. Meeting of creditors at 14, Bardwell Street, Holloway, London, N. 7, on Friday, February 17, at 12 noon.

Liquidators' Notices

MANN & COOK (WEST AFRICA), LTD. (in liquidation). Particulars of claims, by June 1, to F. D'Arcy Cooper, 14, George Street, Mansion House, London, the liquidator of the company.

SAFETEE SOAP CO., LTD. (in voluntary liquidation). Particulars of claims by March 8, to E. Schneitter, 3, Woodstock Street, Oxford Street, London, W. 1, the liquidator of the company.

Edinburgh Gazette

MACLURE (E. & J.), dyers and cleaners, 68, Helen Street, Arbroath. Firm dissolved as at May 28, 1921, by mutual consent.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BIRCH, John, Effingham Square, Rotherham, chemist. £21 17s., November 22.

BLUNT & SON, 69½, Snow Hill, Birmingham, chemists, £28 5s. 6d., December 1.

BRADLEY, V., Front Street, Shotton Colliery, chemist. £12 19s. 4d., December 9.

COX, B. R. L., 63, Kent Street, Hull, druggist. £11 5s. 4d., December 6.

HODSON, Frank, Ousebridge, Carlton, artificial manure manufacturer. £20 19s. 6d., December 5.

JAMES, Evan W., 56 and 58, Oxford Street, Mountain Ash, chemist. £23 1s. 2d., December 7.

PYE, H., 18, Bridge Street, Spalding, chemist, £18 10s. 3d., November 21; and £10 12s. 3d., December 1.

RHODES & DODDS, Klineesie Soap Works, Pontefract, soap mfrs., £11 9s. 6d., December 8.

WAREHAMS, LTD., 5, Wine Office Court, Fleet Street, E.C. 4, dye merchants. £10 9s. 8d., December 8.

Bills of Sale

[*The undermentioned information is from the Official Registry. It includes Bills of Sale registered under the Act of 1882 and under the Act of 1878. Both kinds require re-registration every five years. Up to the date the information was obtained it was registered as given below; but payment may have been made in some of the cases, although no notice had been entered on the Register.*]

GOWER, George Albert, 2, Settle Road, Plaistow, drug store proprietor. £50. February 8.

MOTTERSHEAD, Thomas Henry, 82, Tootal Drive, Weaste, chemical merchant. £70. February 8.

OVERTHROW, William Frank, 22, Umberslade Road, Selly Oak, Birmingham, metallurgist. £40. February 18.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BUTTERLY & TAYLOR, LTD., Partington, soap manufacturers.—Registered January 30, £250 debenture; general charge. *Nil. August 12, 1921.

SLATER & CO., LTD., Bolton, bleachers.—Registered January 20, Trust Deed dated December 30, 1921 (supplemental to Trust Deed dated December 30, 1911), increasing rate of interest payable on £14,000 debentures outstanding; general charge. *£17,000. May 26, 1920.

Satisfactions

BRITISH CELLULOSE & CHEMICAL MANUFACTURING CO., LTD. (late BRITISH CELLULOSE & CHEMICAL MANUFACTURING (PARENT) CO., LTD.), London, S.W. Satisfaction registered February 2, £30,000, part of amount registered, July 18, 1921.

SOCIETE INDUSTRIELLE DU RADIUM, LTD., London, E.C. Satisfactions registered February 2, £5,000, registered August 5, 1920; and £1,700, registered January 31, 1921.

Receiverships

ADNOS, LTD. W. H. Marsden, of 43, Preston New Road, Blackburn, was appointed receiver and manager on February 4, 1922, under powers contained in debentures dated April 7, 1919.

W. A. SOMERVILLE, LTD. J. S. Hassal of 6, Lord Street, Liverpool, was appointed receiver and manager by Order of Court dated February 2, 1922.

New Companies Registered

CHILIAN AND COLONIAL AGENCIES, LTD., 163, Hope Street, Glasgow. Colonial agents, merchants, importers, exporters, manufacturers, &c. Capital, £10,000 in £1 shares.

DESUL SYNDICATE, LTD. To adopt an agreement with the Burlington Industrial Laboratories, Ltd., for the acquisition of patents or processes relating to the treatment or refining of oil, and to demonstrate and work the same or let out on licence or royalty. Capital, £1,000 in 800 ordinary shares of £1 each and 1,600 deferred shares of 2s. 6d. each. A subscriber: H. S. Smith, 1, Windmill Road, West Croydon, Surrey.

THOMAS FELL & CO., LTD. Manufacturers of perfumes and soaps, manufacturing and general chemists, manufacturers of and dealers in toilet requisites, &c. Capital, £1,000 in £1 shares. A subscriber: T. Fell, 3. Ridgmount Street, W.C. 1. chemist.

WESTERN OLEO CO., LTD., Victoria Works, Clayton, Manchester. Manufacturers of and dealers in edible oils, greases, fats, and compounds, and any other business for the time being acquired or carried on by this company as a branch of the Hillcrest Oil Co. (Bradford), Ltd. Capital, £100 in £1 shares.

YOMF MANUFACTURING CO., LTD., 122, Greyhound Lane, Streatham, London, S.W. To adopt an agreement with P. W. Nicol and to carry on the business of manufacturers of and dealers in the liquid preparations for the removal of grease known as "Yomf" and that of manufacturers of and dealers in medicine and medical preparations and drugs, &c. Capital, £5,000 in £1 shares.

Fuerst Brothers, Ltd.

WE understand that the voluntary liquidation of this company is for the purpose of reconstruction, and that all creditors are to be paid in full.